The Milbank Memorial Fund

QUARTERLY

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IN THIS ISSUE

THE peculiar quality of a study of a population of families over a period of years is that it affords the opportunity to obtain information that is dynamic. Thus it is a valuable method suitable for use in many fields.

The paper "The Longitudinal Study of Families as a Method of Research" by Jean Downes presents a general discussion of this method of research. Its value in the study of chronic illness, especially the incidence of such diseases, is brought out for purposes of illustration.

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Pregnancy is a period of nutritional stress and a number of studies have shown that failure of a pregnant woman to consume sufficient amounts of the foods required to supply the increased nutrient demands increases the risk of an unsuccessful outcome of pregnancy and of prenatal complications. As a preventive measure, therefore, it seems desirable that health supervision of prenatal patients should include some appraisal of the nutritive content of their diets and advice on an adequate diet. However, this aspect of prenatal care is seldom emphasized in prenatal clinics operated by hospitals. With the cooperation of a City Hospital in New York, a pilot experiment in teaching nutrition to prenatal patients was conducted by The Community Service Society of New York and the Milbank Memorial Fund. The results of this experiment are reported in the article entitled "An Experiment in Diet Education During Pregnancy" by Katharine Berry and Dorothy G. Wiehl. It was found that women who had fairly adequate diets, judged by nutrient allowances recommended for pregnancy, had a

lower incidence of pre-eclampsia and had fewer premature babies than the women with less adequate diets. Also, among a group of women given diet instruction, the incidence of prematurity and pre-eclampsia was lower for a comparable group not instructed. Thus, this Study adds to the evidence from previous studies that improved nutrition during pregnancy affords an important preventive measure in a maternal and infant health program.

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The series of reports bearing the general title "Social and Psychological Factors Affecting Fertility" is continued in this issue with an article "Fertility Rates and Fertility Planning by Character of Migration," prepared by J. F. Kantner and P. K. Whelpton. This is an analysis of Indianapolis Study materials collected for testing the hypothesis that "the number, size, and location of communities in which couples have lived affect the proportion practicing contraception effectively and the size of planned families."

THE LONGITUDINAL STUDY OF FAMILIES AS A METHOD OF RESEARCH

JEAN DOWNES[1]

THE peculiar quality of a study of a population of families over a period of years is that it affords the opportunity to obtain information which is dynamic. Thus it is a valuable method suitable for use in many fields.

The growth and decline of the family as a biologic unit can be described. In the field of population, growth is depicted by the number of children born to a given union in relation to the date of marriage and the age of husband or wife. However, the size of the family is dynamic for reasons other than growth. It is subject to depletion over a period of time by death of members, and also to dissolution by divorce or separation from the family of one spouse.

The growth of the family as a social unit can also be described if measurable characteristics of such growth can be developed. Also, the family can be described as an economic unit and since changes in this respect provide fairly objective data, it is possible to note them over a period of time.

In the field of anthropology, Kluckhohn has suggested that contemporaneous observation of persons over a period of time may yield even better and more reliable information concerning culture and personality than is obtained from retrospective life histories (1).

An adequate description of a population of families is more difficult than is a description of a population of persons. The family is complex and is constantly undergoing change. An extreme example of its complexity may be cited. The mobility among a sample of Negro tuberculous households in Upper Harlem, New York, was studied. This investigation included a description of the movement of persons into and out of the households. The households were composed of the immediate

[1] From the Milbank Memorial Fund. This paper was presented at the Annual Conference of The Milbank Memorial Fund, November 14-15, 1951.

family unit, that is, husband, wife and their children, other relatives, and lodgers. Members of the immediate family moved at the rate of 17 per 100 persons per year, other relatives at the rate of 46 per 100 per year, and lodgers in these families moved on the average twice a year; their rate was 196 per 100 persons per year (2).

The longitudinal study of a population composed of families was originated by Sydenstricker. He described the purpose of the study made over a period of twenty-eight months (December, 1921–March, 1924) in Hagerstown, Maryland, as follows: "This record, the first of its kind as far as we are aware, was regarded as desirable in order to give a picture of the sickness *incidence* in a general population over a sufficiently long period of time to distinguish it from sickness prevalence as ascertained at a given instant in time by the cross section method" (3).

In studies of diseases of long duration, Frost introduced a new concept of epidemiology—that studies of such diseases must be carried out over a long period of time (4). For example, it is characteristic of tuberculosis that the time intervening between exposure to infection and the development of clinical symptoms of disease is much longer than in the acute communicable diseases. Persons who have had familial exposure should be followed over a considerable period of years if incidence of disease among them is to be obtained.

It is apparent that the longitudinal observation of families was introduced in order to study disease. As a method of study, however, it has many other potentialities. It can be used in the study of health.

Reed has emphasized the possibility of studying "health" instead of disease provided that suitable gradations or measurements with respect to health can be determined. At the Fund's Annual Conference in 1947, Reed said "A definition of positive health . . . . is a problem calling for research in physiological fields; some of the work being done in geriatrics at the present time will be helpful in this direction, but a real solution will come when we have better concepts and better knowl-

edge of the development of the human being as a functioning organism. Rather than a seeming separation of pediatrics from geriatrics, we need knowledge as to the growth and development of physiological processes as we proceed from infancy to old age. This knowledge may give us some of the yardsticks necessary for an evaluation of 'positive health' and may help us to lay down objectives in this field" (5).

The concept of long-term field studies of the child in his natural environment is fairly new. An important study of this sort is being conducted by Sir James Spence in Newcastle Upon Tyne. The objective of the investigation was to study 1,000 infants from the day of their birth through their 8th year of life. According to Sir James Spence, this study of 1,000 infants inevitably became a study of 1,000 families. The records which are being accumulated show how 1,000 families drawn from all social classes live, how they react to the problems of life, how they avail themselves of the health services, how the children are nurtured in body and mind, what their activities are, and the relation of these to others in the family. This approach to the study of child life holds great promise of valuable results (6).

To return to the use of longitudinal observation of a population as a method of study of disease, I wish to place emphasis upon the unique possibilities which this method affords in the study of chronic conditions. One of these possibilities is the observation of incidence of such diseases in the population. Illnesses of a chronic nature have a low incidence, that is, recognition of newly-diagnosed cases, in comparison with their prevalence at any given time. For example, in the population observed in the Eastern Health District of Baltimore, the annual incidence of new diagnoses of "major chronic" illness was 23.6 per 1,000 person years compared with a prevalence of 178 per 1,000 person years (7). It is apparent that if prevalence is not considered, incidence of new cases alone will not reveal the true state of the population with respect to the presence of chronic disease in it.

The incidence or attack rate of chronic disease, however, is of particular interest to many workers in the field of health and especially to the epidemiologist. Observation of cases from the time of first recognition or first diagnosis enables more accurate study of the course of the disease in time and of the effect of such illness upon the family than is possible from retrospective histories. Furthermore, cases prevalent in the population at a given time cannot be used for this type of study since they represent survivors only. Close observation of a population over a one-year period is not a sufficient time for gauging accurately disease and conditions which develop slowly and occur at a relatively low rate.

Incidence of Chronic Conditions

Data from the morbidity study in the Eastern Health District of Baltimore over the five-year period June, 1938 to May, 1943 are presented to illustrate various ways of expressing incidence.

Briefly, the method of the study was as follows: Families living in thirty-four city blocks were visited at monthly intervals to obtain a record of illness of their members. In seventeen of the thirty-four city blocks the families were visited over a period of five years; in the other seventeen, visiting was continued for three years. Careful inquiry was made concerning members of the family who were in institutions for the mentally ill, for the feeble-minded, for the tuberculous, and for other chronic conditions requiring institutional care.

The instructions for the use of the family visitors contained a list of the more common chronic diseases about which special inquiry was to be made. This special information included data concerning onset of the first symptoms of the disease, their nature and date, the date first diagnosed, and whether the diagnosis was made by a private physician, at a clinic, or at a hospital. Illnesses that were reported as chronic were asked about on each subsequent visit to the family. Inquiry was made concerning the amount of discomfort or disability suffered from the condition since the last visit and the amount and nature of medical care received for it.

The causes of chronic illness as reported by the family informants were submitted to attending physicians for confirmation or correction. The cases which had clinic attendance and hospital admissions were also checked against the records of the clinic or hospital where the service was given. The only exception to this procedure was for cases hospitalized outside the City of Baltimore.

The chronic conditions included in this analysis are those classed as "major." They include: heart disease, hypertension or high blood pressure, arthritis, tuberculosis, diabetes, chronic nephritis, rheumatic fever, varicose veins, chronic gall-bladder disease, syphilis, malignant neoplasm, peptic ulcer, toxic goiter, epilepsy, mental deficiency, psychoses and psychoneuroses, and other important but relatively rare conditions, such as Parkinson's disease, cerebral palsy, and multiple sclerosis.

When a population of families is first surveyed for illness the chronic diseases usually form the major proportion of the total illnesses present at that time. In the study in the Eastern Health District of Baltimore, from 60 to 70 per cent of the total illnesses reported as present at the time of the first visit were those of a chronic nature. These were all conditions which had their onset prior to observation of the family and cannot be considered as incident within the period of observation. Information concerning the presence of persons in the population with chronic disease which had its onset before observation makes it possible to separate these persons from those at risk of development of such conditions during subsequent observation. Thus we have two classes of population—those who reported the presence of chronic illness and those who considered themselves as free from a chronic condition at that time. There are also two classes of families—those in which one or more persons were reported to have a chronic illness and those which reported their members as having no chronic condition.

This fact should be stressed. Incidence of chronic disease as expressed in this analysis is the incidence of a new or first diagnosis or report of such disease in the observed population at

risk. Quite different results would no doubt be obtained if all persons in the sample population had frequent medical examinations to detect the presence of chronic conditions. However, it is believed that incidence which includes only persons sufficiently ill to obtain a diagnosis of the illness has value and in fact it is the only measure of incidence we have at the present time.

Table 1. Annual incidence of new diagnoses of chronic disease.

Diagnosis Class	Rate Per 1,000 Population (20,832 Person Years)
Total	23.6
1. Arthritis	4.6
2. Heart Disease	5.1
3. Hypertensive Vascular Disease and Arteriosclerosis	3.3
4. Psychoneurosis and Nervousness	2.2
5. Rheumatic Fever	1.2
6. Varicose Veins	0.6
7. Gall-Bladder Disease	1.1
8. Diabetes	0.5
9. Mental Deficiency	0.0
10. Psychosis	0.4
11. Tuberculosis	0.9
12. Syphilis	0.3
13. Neoplasm (Malignant)	1.2
14. Peptic Ulcer	0.5
15. Goiter (Toxic)	0.1
16. Other Chronic Diseases	1.8

The annual incidence of new diagnoses of major chronic disease by type is of interest. Table 1 shows these data for the total sample population in the thirty-four city blocks. The population for this table is composed of 20,832 person years. Heart disease, type No. 2 on the table, occurred most frequently. If all circulatory disease be considered, types 2 and 3, the rate was 8 per 1,000 per year, a rate almost double that for arthritis. The incidence of new cases of psychoneurosis and nervousness was 2 per 1,000 per year. Rheumatic fever, type No. 5, and malignant neoplasm, type No. 13, had an annual frequency of slightly more than 1 per 1,000 person years.

One interesting point brought out by this table is the fact that, excepting arthritis and psychoneurosis and nervousness, the leading chronic illnesses which appear in incidence of new cases are also leading causes of death.

During the first year of the study there was in the seven-

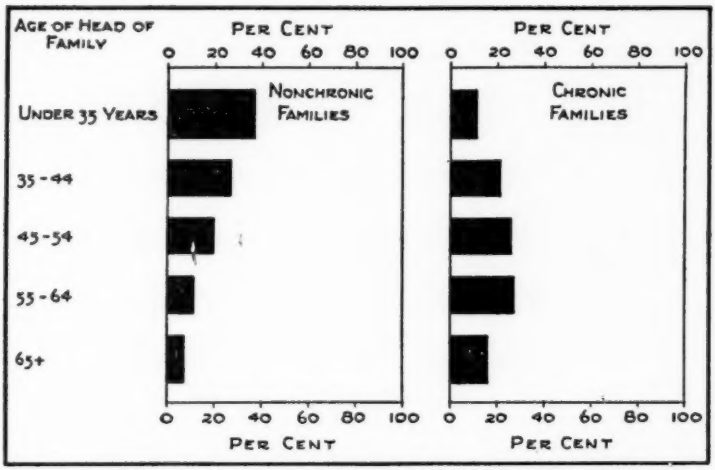

Fig. 1. Distribution of "nonchronic" and "chronic" families according to the age of the head of the family.

teen city blocks observed for five years a total of 951 families. These families must have been observed two months or longer to be included in the study. 305 or 32 per cent were classed as "chronic families," that is, families in which one or more members reported the presence of a major chronic condition. Figure 1 shows the distribution of the families according to the age of the head. The left-hand side of the chart shows the "nonchronic" families and the right-hand side those which reported one or more cases of chronic illness when first observed. There is a striking difference between the two groups. The majority of the "nonchronic" families was in the younger age groups; addition of the first and second bars shown in the chart indicates that in 63 per cent the head of the household was under 45 years of age. In the "chronic" families, only 31 per cent of the families were in these two age groups.

Incidence of Persons With First Diagnosis. One way of presenting incidence of chronic disease in the longitudinal study is to show the annual rate in each year at which persons from the nonchronic population are transferred to the

population classed as having chronic disease. These data are based on the seventeen city blocks observed for five years and are shown in Table 2. Here the population (Column 3) is composed of persons who have not had a diagnosis of a major chronic disease or condition. The population is expressed in person years. The rates from the first to the fourth year range from 17 to 22 per 1,000 in the population at risk of such a diagnosis. There was a sharp decline in the fifth year. The incidence of persons newly diagnosed in that year was less than half the rate noted in any of the preceding years. Evidently by the fifth year some selection in the observed population had taken place.

Incidence of New Diagnoses of Chronic Disease. A second way of presenting incidence of chronic disease in the longitudinal study is to show the incidence of new diagnoses of chronic conditions. Here the population at risk includes not only those who were reported as free of any chronic condition but also those who at the beginning of observation were reported to be affected by the presence of chronic illness. The population in the latter group are at risk of developing

Table 2. Incidence of first diagnosis of chronic disease among persons at risk.

Study Year	Annual Rate Per 1,000 Person Years	Number of Persons With First Diagnosis of Chronic Disease	Number of Person Years at Risk
First Study Year (6,1938-5,1939)	20.9	56	2,682
Second Study Year (6,1939-5,1940)	16.9	44	2,600
Third Study Year (6,1940-5,1941)	21.9	55	2,516
Fourth Study Year (6,1941-5,1942)	18.9	45	2,376
Fifth Study Year (6,1942-5,1943)	8.1	18	2,217

a different and unrelated chronic condition. For example, a person with hypertrophic arthritis has the risk of developing heart disease or cancer as do others of the same age and sex in the general population. When the rate of development of arthritis is considered, those known to have arthritis are excluded. This procedure applies to each type of chronic illness.

Table 3 shows the total incidence of new diagnoses (Column 2) and the incidence of new diagnoses among persons previously reported as free of any chronic illness (Column 1). These rates are presented in the same table to illustrate the fact that consideration of all new diagnoses does not distort the incidence rates. The rate of new diagnoses is composed chiefly of instances of persons with a first diagnosis of chronic illness. However, it should be emphasized that incidence among nonchronic persons only does not give a true picture of the incidence of disease when the total community is considered. Here the rates in the first four years range from 22 to 25 per 1,000 person years compared with rates of 17 to 22

Table 3. Incidence of first diagnosis of chronic disease among persons and of new diagnoses.

Study Year	Rate Per 1,000 Person Years		Number	
	New Persons With Chronic Disease	New Diagnoses of Chronic Disease	New Persons With Chronic Disease	New Diagnoses of Chronic Disease
First Study Year (6,1938-5,1939)	20.9	22.6	56	68
Second Study Year (6,1939-5,1940)	16.9	21.6	44	63
Third Study Year (6,1940-5,1941)	21.9	25.0	55	71
Fourth Study Year (6,1941-5,1942)	18.9	22.4	45	60
Fifth Study Year (6,1942-5,1943)	8.1	12.3	18	31

per 1,000 person years among those with a first diagnosis of chronic disease.

The consideration of the incidence of new diagnoses, both in the nonchronic and chronic populations is important because, in community planning for adequate facilities for care and treatment of chronic disease, it is advantageous to know the size of the problem in terms of the number of diagnoses rather than solely on the basis of persons affected. For example, the patient with arthritis and hypertensive vascular disease may need treatment for both conditions.

Incidence of Family Units With a First Diagnosis of Chronic Disease. The longitudinal study of families affords a third expression of incidence, that is, the rate at which family units were affected by a first diagnosis of chronic illness in one of their family members. The population at risk is composed of family units reported to be free of chronic illness at the beginning of observation; that is, no member was reported as affected.

Table 4 shows for each study year the per cent of the nonchronic families which had a first diagnosis of chronic disease

Table 4. Per cent of nonchronic families with a first diagnosis of chronic disease in a family member.

Study Year	Number of Families Present in Each Year	Families With First Diagnosis of Chronic Disease in Each Year	Per Cent With First Diagnosis of Chronic Disease in Each Year
First Study Year (6,1938-5,1939)	646	31	4.8
Second Study Year (6,1939-5,1940)	611	23	3.8
Third Study Year (6,1940-5,1941)	562	28	5.0
Fourth Study Year (6,1941-5,1942)	534	24	4.5
Fifth Study Year (6,1942-5,1943)	450	11	2.4

in a family member. The per cent which became affected ranged from 4 to 5 during the first four years of the study. There was a sharp decline in the fifth year. Only 2 per cent of the 450 families observed in that year reported a first diagnosis of chronic illness in one of their family members.

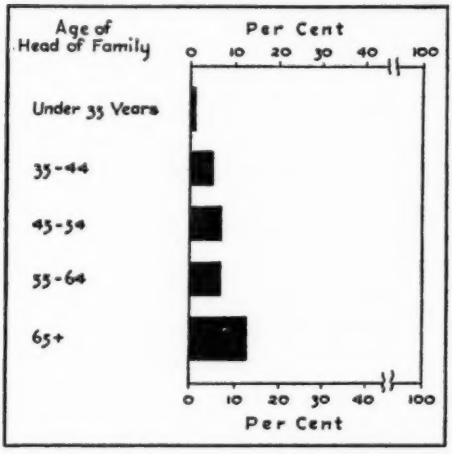

Fig. 2. Per cent of "nonchronic" families, according to the age of the head of the household, where a diagnosis of chronic disease was made for the first time.

Figure 2 shows for the first study year the per cent of the nonchronic families in each group—according to the age of the head of the family—where during that period a diagnosis of chronic disease was made for the first time. Young families (head under 35 years of age) yielded the smallest proportion, 1 per cent, of their total and those where the head of the family was 65 years of age or older, the highest proportion, 13 per cent. This is as expected. However, it is of interest that from 5 to 7 per cent of the families in the other three age groups had a member who brought them for the first time into the category "chronic disease families." Also, it is noteworthy that no age group was entirely exempt from the risk of producing families with a member who developed a chronic condition to the point that it was reported as illness.

In the new chronic families, heart disease was the most frequent diagnosis; those next in order were arthritis, hypertensive vascular disease, rheumatic fever, cancer, and psychoneurosis.

It is certainly apparent that family units with no chronic disease among their members when first observed became

affected at a fairly regular rate, year by year. The longitudinal study offers an unusual opportunity to study these families which have been observed with equal care before and after the advent of a diagnosis of chronic disease in one of their members. For example, in 45 per cent of the new chronic families, the head of the household was the patient. It will be of interest to learn the effect of a major illness upon all of these family units and especially those where the patient had a great responsibility in that unit.

The incidence among persons with a first diagnosis of chronic illness, the incidence of total new diagnoses and of new families affected all showed annual rates which were consistent in their general level during the first four years of observation of the population in the seventeen city blocks. None of the variations in incidence noted in that period were statistically significant. The consistency of these rates over a period of time supports the belief that they express a reality, that is, the rate at which persons become so aware of illness that they obtained a diagnosis or reported it as an existing condition.

From the data presented, it is evident that by the fifth year of the study some sort of selection had taken place in the population being observed for illness. There was a significant decline in the incidence of new persons with a first diagnosis or report of chronic disease, and of new diagnoses in the fifth year compared with any previous year. There was also in that year a significant change from the other years with respect to the proportion of families previously classed as nonchronic which for the first time reported a member as having an important chronic illness.

One form of selection may arise from refusal of the family to cooperate in the study. Table 5 shows in each year the per cent of the total families which refused to cooperate. The data are shown for families classed as nonchronic and for those classed as chronic. In both groups of families, refusal to cooperate occurred most frequently in the first study year.

About 5 per cent in each group were lost to the study in that year. The proportion lost to the study declined sharply in the second and third years compared with the first year. In the fourth and fifth years the proportion who wished to be dropped from the study increased and reached the level of the first year. It is important to note that in each year a smaller proportion of the families with chronic disease refused to cooperate than was true of families with no person in them who reported a major chronic condition. The difference between the two groups of families with respect to the proportion which refused cooperation is statistically significant in the third year, in the fourth year, but not in the fifth year.

Table 5. Per cent of families present in each study year which refused to cooperate in the study.

Study Year	Nonchronic Families	Chronic Families
First Study Year (6,1938-5,1939)	5.4	4.9
Second Study Year (6,1939-5,1940)	3.3	1.2
Third Study Year (6,1940-5,1941)	1.8	0.3
Fourth Study Year (6,1941-5,1942)	4.5	1.4
Fifth Study Year (6,1942-5,1943)	5.3	3.6

Some of the other possibilities for the study of chronic illness which the longitudinal observation of a population affords may be mentioned briefly. It is of interest to learn how chronic illness manifests itself over a period of time. Is the risk of disability from chronic disease greatest at the time of first diagnosis and does that risk diminish with time? Persons found to be diabetic and those who have survived their first attack of coronary disease may be cited as those where the risk of disability may decrease with time. What proportion of the total adjust and learn how to live with their chronic conditions? Or is the disease of such a rapidly progressive nature that the risk of disability increases with time? Some types of cancer may illustrate diseases in this

category. Also, disabling episodes of chronic illness can be related to the total observed population in order to express the general risk of such illness. It may be that some of these questions cannot be answered in a period so short as five years. However, it will be of interest to explore the possibilities for doing so.

Family Patterns of Chronic Disease

The study of chronic illness in the Eastern Health District of Baltimore has also made it possible to investigate family patterns of disease. An index case was designated for each family with "major chronic" disease, that is, the index case was the person with a chronic condition which determined the classification of the family. In families where, at the time of first observation, there was more than one living case of "major chronic" disease, the case with the earliest onset was selected as the index person. It was then possible to learn whether other members of the family tended to have the same type of chronic illness as the index case.

During the period of study of the families in the thirty-four city blocks in the Eastern Health District, a total of 828 families reported one or more cases of chronic illness among their members. The shortest possible period of observation of these families was two months and the longest possible period was five years. Excluding the index case, these families contained 2,842 people. The presence of some major chronic condition was reported for 15 per cent of these family members.

To illustrate the family pattern of chronic illness, all families in which there was a person designated as ill because of psychoneurosis or nervousness are compared with the total universe of chronic-disease families. There were 90 such families. The index case in each of these families was an adult 20 years of age or older who was diagnosed as psychoneurotic or who reported chronic nervousness.

It should be explained that patients do not report themselves as having a psychoneurosis. This term is not a part of

their vocabulary. They report their illness in terms of complaints or symptoms. The diagnosis "psychoneurosis" comes from the attending physician. Sixty-six of the 90 index cases, or 73 per cent, had such a diagnosis. The remaining 24 patients complained of chronic nervousness but were not seen by a physician because of their complaint.

The complaints of the 66 diagnosed by a physician were as follows:

Nervous with:

Indigestion	Giddiness and dizzy spells
Cardiac symptoms	Stuttering
Menopause	Loss of voice
Low blood pressure	Nervous throat
High blood pressure	Lump in throat
Headache	Melancholy
Shortness of breath and choking	Worry
Weakness and run down	Itching all over

The complaints of the 24 not seen by a physician were similar to those who received a diagnosis.

In a study of the complaint of nervousness and the psychoneuroses in the population of the Eastern Health District, made by Lemkau and his associates, it was concluded that "the lay term nervous is used to cover a multitude of psychiatric conditions, but when treated as a residual group, after the removal of known psychotics and mental defectives, this group corresponds in sex and race distribution patterns to the group of adult cases diagnosed psychoneurosis or as having neurotic traits" (8). This was considered as sufficient reason for including nervous cases in a group called the "adult neurotic group." Therefore, in this analysis the 24 index cases with chronic nervousness were included with the 66 who had the diagnosis psychoneurosis.

This table (Table 6) compares the per cent of persons with specific diagnoses in the 90 families, index case psychoneurosis or chronic nervousness, and those in the total 828 families, the

Diagnosis Class	Index Case Psychoneurosis (90 Families)	Index Case Major Chronic Condition (828 Families)	Ratio Column 1 / Column 2
Total	26.98	14.80	1.82
1. Mental Disorder or Mental Deficiency	3.81	0.32	11.91
2. Mental Retardation	0.32	0.14	2.29
3. Psychoneurosis or "Nervousness"	1.90	1.48	1.28
4. Rheumatic Fever	2.54	1.09	2.33
5. Heart Disaese	4.76	2.64	1.80
6. Hypertensive Vascular Disease and Arteriosclerosis	3.81	1.72	2.22
7. Diabetes	0.63	0.35	1.80
8. Arthritis	2.86	2.67	1.07
9. All Other Chronic Diseases	6.35	4.39	1.45

Table 6. Per cent of persons with a major chronic condition in two groups of families (index cases excluded).

universe from which the 90 families were drawn. Column 3 indicates the ratio of the per cent of persons affected in the families, index case psychoneurosis, to those affected in the total 828 families. All index cases have been excluded from both groups. It certainly is apparent that persons with chronic illness are more highly concentrated in these 90 families than in the total universe of families from which they were drawn. The differences in the per cent affected in these families and in the total 828 families are highly significant.

An examination of the 90 families with regard to socio-economic factors revealed no important difference between them and the 828 families from which they were drawn. They were similar with respect to size, to moving, crowding, income, home ownership, and education of persons 20 years of age and older.

From the etiological point of view, it may be that a concentration of chronic conditions among members of families tends to produce psychoneuroses among some of those not otherwise affected. In other words, the stress upon the family brought about by illness may be so great that responsible mem-

bers of the family may be affected to the degree that they seek an escape in illness. However, genetic and constitutional factors in these families have not been studied and it may be profitable in future investigations to consider such factors.

One of the most important potentialities of the study of families over a period of time is the determination of a better understanding of family attitudes towards health and towards illness. Late diagnosis of chronic illness is a problem difficult to cope with and we have been prone to consider that it is in great part due to an economic barrier between the patient and the procurement of medical care. However, there are other barriers. The psychological barrier between the knowledge of the presence of symptoms and the procurement of a diagnosis is real, very real. A person may feel under par as to his health but he may wish to avoid as long as possible the knowledge as to why he is not well.

Experiments which are now under way, The Health Insurance Plan of Greater New York and The Family Health Maintenance Plan, will no doubt increase our understanding of family attitudes towards health and sickness. In these experiments the economic barrier to procurement of medical care has been removed and those in charge are doing their utmost to remove the psychological barrier through a campaign of education for better health through use of medical service. Their results will need to be carefully measured. They will be eagerly awaited.

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AN EXPERIMENT IN DIET EDUCATION DURING PREGNANCY

KATHARINE BERRY AND DOROTHY G. WIEHL[1]

THAT there is an intimate relationship between the nutritional status of a mother and her well-being during pregnancy as well as that of her baby would scarcely be questioned today. Nevertheless, health supervision in prenatal clinics rarely includes any individual teaching of mothers concerning dietary requirements during pregnancy. No personnel is provided in hospitals for this service, and physicians give attention to the diet of a patient chiefly after toxic symptoms or excess weight gain are noted. The potential value of diet education for mothers in preventing complications of pregnancy and infant loss has been recognized by many public health workers, but programs for integrating such a service into hospital prenatal clinics have not been developed.

In 1947 the Nutrition Committee of the Bronx Council of Social Welfare became interested in the problem of teaching nutrition to patients in prenatal clinics in City Hospitals in New York and enlisted the cooperation of Morrisania City Hospital[2] for a maternal nutrition demonstration. It seemed desirable to evaluate the results of the demonstration, and a pilot experiment was planned with advice from the technical staff of the Milbank Memorial Fund. The Community Service Society of New York made it possible to conduct the project by furnishing a nutritionist and a nurse who took the diet histories and gave nutrition instruction to patients.[3]

This experiment in diet education was undertaken with two

[1] From the Milbank Memorial Fund in cooperation with the Community Service Society and Departments of Health and of Hospitals of New York City.

[2] Grateful acknowledgment is made to Dr. Nathan Smith, Medical Superintendent, and to Dr. Milton Goodfriend, Director of Obstetrics at Morrisania Hospital, for their cooperation in this Study; also to the medical, nursing, and administrative staff of the prenatal clinics, and to the staff of the record room at Morrisania Hospital for assistance throughout the Study.

[3] A major share of the credit for this Study should go to Mrs. Gertrude Odmark, nutritionist of the Nutrition Service, and to Miss Rose E. Line, nurse of the Department of Educational Nursing, of the Community Service Society.

objectives: first, to determine whether, with individual instruction on specific ways to improve the diet, prenatal patients with very low incomes would change their dietary patterns; and second, to evaluate whether the quality of their diets would have a demonstrable relationship to complications or outcome of pregnancy.

Study Procedure. Prenatal clinics are held at Morrisania City Hospital on Mondays for new patients and on Fridays for revisits. New patients register on their first visit and return one week later for the first physical examination. Thereafter, visits are at monthly intervals except when special visits are needed. All nulliparas were referred to the Study by a nurse at registration if pregnancy was estimated to be not later than the 20th week of gestation or if the patient had not felt life. However, some patients accepted for the Study were more advanced in pregnancy and have been included if not more than twenty-four weeks of gestation. Late in the Study a few multiparas were included.

Patients accepted for the Study were interviewed and a diet history taken at their first clinic visit. Alternate patients were given diet instruction. The patients who received no diet instruction (Controls) were interviewed once more on a revisit, usually at twenty-eight to thirty-four weeks of gestation. The Instructed patients were seen again, whenever possible, at the next monthly visit and a third time at twenty-eight to thirty-four weeks of gestation.

Histories taken at each interview included a record of food eaten at each meal and between meals for the previous day, a normal day's diet when that for the previous day was unusual, and the consumption in the previous week of important types of food. In addition, information was obtained on certain habits, as for example, the amount and kind of fluids consumed in one day, and on any symptom or discomfort the patient may have noted. Also, women were questioned as to the family income and living arrangements, were asked their immediate pregravid weight, and were weighed and measured.

Only advice on diet was given to any patient and that only to those in the group selected for instruction. If the patient asked advice for a specific condition, she was urged to call the matter to the attention of the doctor in the clinic who usually was seen after the diet interview.

Suggestions on specific ways to improve the reported diet were given to each woman in the Instructed group at each of the interviews. The importance of different types of foods was explained and, through the use of charts and the distribution of pamphlets, the most economical foods were pointed out. If the patient reported insufficient money to carry out the suggestions given, she was urged to contact the Social Service Department of the hospital for assistance.

After the delivery of the patient, data on her prenatal clinic record were copied and also some information on delivery and on the condition of the infant was abstracted from the hospital records. If the delivery record was not found at Morrisania Hospital after the expected date of delivery, a questionnaire was mailed to the home address of the patient asking for information about the delivery and the baby. If the questionnaire was not returned, a home visit was made by the nurse in a further effort to locate the case. The records for deliveries in other hospitals in New York City were made available[4] and were copied. Nine cases in each of the two Study groups who were delivered in other hospitals are included in the following analyses.

Population of Instructed and Control Groups

The first interview with any patient included in the Study was on April 19, 1948 and the last on July 21, 1950. The last delivery of any patient occurred on October 11, 1950. The total number of women entered in the Study and the numbers of incompleted and lost cases are shown in Table 1.

In spite of every effort to locate all cases, the outcome of

[4] Acknowledgment is made to the following hospitals where records were made available for use in this Study: Bellevue, City, Columbia-Presbyterian Medical Center, Fordham, Harlem, King's County, Lincoln, Metropolitan, Mother Cabrini, Queen's General, St. Mary's, and Sydenham.

	Total Patients	Instructed Patients	Control Patients
Patients With One or More Diet Interviews	260	137	123
Outcome of Pregnancy Known	226	116	110
Abortion[a]	13	6	7
Multiple Births	3	2	1
Late Registration (After 24th Week of Gestation)	3	2	1
Only One Prenatal Visit	3	2	1
Only One Diet Interview	9	4	5
Delivered Out of City, Incomplete Record[b]	5	5	0
Cases With Acute or Chronic Conditions Diagnosed	28	14	14
All Other Cases	162	81	81
Outcome of Pregnancy Unknown	34	21	13

[a] Includes one live birth, weight 1 lbs. 11 oz., baby died.
[b] One case delivered in New York City.

Table 1. Number of patients interviewed in the Morrisania Prenatal Clinic for purposes of the study.

pregnancy was unknown for thirty-four patients, twenty-one of whom were in the Instructed group. Only six of these women, three in each of the two Study groups, had been seen for the interview scheduled between twenty-eight and thirty-four weeks of gestation. The majority of the remainder were interviewed only once, and they were found to be delinquent at the clinic after from one to three visits, including the first visit to register.

Of 226 women with the outcome of pregnancy known, thirteen were delivered of nonviable products of pregnancy and three were delivered of twins. In addition, the available records for twenty cases were considered incomplete or inadequate. These cases have been excluded from all tabulations. Examination of the clinic and hospital records revealed that twenty-eight women had been diagnosed with acute or chronic conditions,[5] that not only warranted special supervision from the

[5] There were fourteen cases with a positive serology test for syphilis; four with chronic kidney or hypertensive disease; three with acute kidney or bladder infections; five with a history of rheumatic heart disease; two with pneumonia; one with

(Continued on page 123)

clinic or hospital in most instances, but also subjected the patient to a greater risk of complications with the pregnancy. They were excluded also from further analyses of the data, leaving eighty-one women for study in each of the groups, Instructed and Control.

Table 2. Distributions of the Instructed and Control patients according to age groups.

Age Groups	Per Cent of Total	
	Instructed	Control
Total	100.0	100.0
15–19	39.5	30.5
20–24	42.0	45.1
25–29	13.6	18.3
30–34	3.7	3.7
35–39	1.2	2.4
Total Number	81	81

The general characteristics of the populations in the two groups were remarkably similar. There were fifty-nine Negro women in each Study group, and of the twenty-two white patients in each group, eight of the Instructed and eleven of the Control were Puerto Ricans. Among the Instructed women, nine were multiparas and sixteen were not married compared with ten multiparas and eleven unmarried among the Controls. Only eight women, two in the Instructed and six in the Control group, reported any public assistance at time of first interview.

The distributions by five-year age groups are shown in Table 2. Sixty-six of the Instructed and sixty-two of the Control women were under 25 years of age. Although there was a somewhat greater proportion of Instructed than of Control patients who were in the 15–19 age group, there were six in each group aged 15 or 16, and twelve and eleven who were 17 or 18 years of age among the Instructed and Control groups, respectively. Only four Instructed and five Control cases were over 30 years of age.

The final diets reported after two periods[6] of instruction

tuberculosis; one with a myomectomy during the pregnancy; and one with elephantiasis. Three of the positive serology cases were diagnosed also with one of the other chronic conditions.

[6] Eleven women in the Instructed group were seen only twice, and the second record for these cases after one period of instruction has been tabulated with the final diets.

were used to measure the change in diets for the Instructed women and for comparison with the records for the Control group taken during the third trimester of pregnancy. The weeks of gestation at which the patients were interviewed for the first and final records are shown in Table 3. Although expressed as weeks of gestation, they are estimated from the weeks antepartum. For some cases the reported date of the last menstrual period was obviously erroneous and the weeks antepartum indicate accurately the time before delivery that the patient was in the Study. Eight Instructed and six Control patients with gestation estimated in this manner were first seen after twenty weeks.

Three-fourths of the Instructed patients and more than four-fifths of the Control patients were seen for the final interview between twenty-seven and thirty-five weeks of gestation. Some of the patients were irregular in attendance at the clinic and considerable difficulty was encountered at times in locating patients for a scheduled interview.

Table 3. Distributions of the first and final diet records according to the weeks of gestation at interview.

Weeks of Gestation[a]	Per Cent of Total Cases			
	First Interview		Final Interview	
	Instructed	Control	Instructed	Control
Total	100.0	100.0	100.0	100.0
12	22.2	23.5		
12–14	24.7	24.7		
15–17	28.4	25.9	1.2	
18–20	14.8	18.5	2.5	
21–23	9.9	6.2	3.7	1.2
24–26		1.2	3.7	7.4
27–29			13.6	18.5
30–32			34.6	29.6
33–35			27.2	35.8
36–37			8.6	3.7
38–39			4.9	3.7
Total Number	81	81	81	81

[a] The weeks of gestation have been estimated from the date of delivery because of obvious inaccuracies for some cases in reported dates of last menstrual period.

Method of Analysis of Diet Records

The amounts of protein, calcium, iron, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid furnished by the one-day diets reported at the first and final interviews were estimated from food value tables of the Federal Security Agency (1) and of Bowes and Church (2). The estimated amount of each of these eight nutrients was then expressed as a percentage of the amount of the specific nutrient recommended for pregnancy[7] by the National Research Council in the 1948 revision (3). *See* Appendix 1. For each nutrient, the diets were rated in three broad classifications: good, 90 per cent or more of the recommended allowance; fair, 60 to 89 per cent; and poor, less than 60 per cent.

An over-all measure or index of the quality of the one-day diets was based on the ratings for the eight nutrients. A diet was classified as "good" if it had furnished 90 per cent or more of the recommended allowance for at least five nutrients and not less than 60 per cent of the allowance for any; as "fair" if it supplied 90 per cent or more of the allowance for less than five nutrients and less than 60 per cent for not more than two; and "poor" if the diet was estimated as furnishing less than 60 per cent of the allowance for three or more nutrients.

The record of foods consumed in one week was not obtained in sufficient detail to permit a quantitative tabulation of servings or amounts of most of the important food groups. The number of quarts or cans of milk, amounts of cheese or ice cream, the number of eggs, and the number or cans of specific fruits, juices, or tomatoes usually were reported. Since these foods represented an important part of the teaching program, the estimated weekly consumption of quarts of milk, numbers of eggs, and servings of foods which were good sources of ascorbic acid have been tabulated. The basis for the conversion of canned milk, cheese, and ice cream to quarts of milk,

[7] Although the pregnancy allowances are for the latter half of pregnancy, these amounts were used as a base for all diets. Most of the first diet histories were obtained earlier than an increased intake because of pregnancy is recommended.

Per Cent of Recommended Allowance for Specified Nutrient	Per Cent of Women			
	First Diet		Final Diet	
	Instructed	Control	Instructed	Control
Total Cases	100.00	100.00	100.00	100.00
Protein				
90 Per Cent or More	37.04	39.51	49.38	50.62
60—89 Per Cent	44.44	39.51	30.86	33.33
Less Than 60 Per Cent	18.52	20.99	19.75	16.05
Calcium				
90 Per Cent or More	20.99	19.75	35.80	34.57
60—89 Per Cent	24.69	32.10	34.57	25.93
Less Than 60 Per Cent	54.32	48.15	29.63	39.51
Iron				
90 Per Cent or More	22.22	25.93	40.74	32.10
60—89 Per Cent	40.74	40.74	33.33	48.15
Less Than 60 Per Cent	37.04	33.33	25.93	19.75
Vitamin A				
90 Per Cent or More	44.44	51.85	69.14	51.85
60—89 Per Cent	23.46	23.46	12.35	20.99
Less Than 60 Per Cent	32.10	24.69	18.52	27.16
Thiamine				
90 Per Cent or More	29.63	23.46	50.62	41.98
60—89 Per Cent	33.33	43.20	24.69	45.68
Less Than 60 Per Cent	37.04	33.33	24.69	12.35
Riboflavin				
90 Per Cent or More	27.16	32.10	41.98	45.68
60—89 Per Cent	33.33	27.16	34.57	28.40
Less Than 60 Per Cent	39.51	40.74	23.46	25.93
Niacin				
90 Per Cent or More	44.44	38.27	41.98	39.51
60—89 Per Cent	34.57	38.27	33.33	38.27
Less Than 60 Per Cent	20.99	23.46	24.69	22.22
Absorbic Acid				
90 Per Cent or More	37.04	50.62	54.32	44.44
60—89 Per Cent	17.28	9.88	18.52	16.05
Less Than 60 Per Cent	45.68	39.51	27.16	39.51

Table 4. Percentages of women in the Instructed and in the Control groups for whom the estimated amounts of each of eight nutrients in reported daily diets furnished specified percentages of the recommended allowances for pregnancy.

and of amounts of fruit, tomatoes, and certain vegetables to servings of foods rich in ascorbic acid are shown in Appendix 2.

First Diet Records for Instructed and Control Groups

The one-day diets reported at the initial interview by women

Number of Women			
First Diet		Final Diet	
Instructed	Control	Instructed	Control
81	81	81	81
30	32	40	41
36	32	25	27
15	17	16	13
17	16	29	28
20	26	28	21
44	39	24	32
18	21	33	26
33	33	27	39
30	27	21	16
36	42	56	42
19	19	10	17
26	20	15	22
24	19	41	34
27	35	20	37
30	27	20	10
22	26	34	37
27	22	28	23
32	33	19	21
36	31	34	32
28	31	27	31
17	19	20	18
30	41	44	36
14	8	15	13
37	32	22	32

assigned to the Instructed and to the Control group are compared in Table 4 and Figure 1. It is apparent that there was little difference between the two groups in the nutritive content of their diets when they registered at the clinic.

Less than half of the patients in each group reported diets which furnished 90 per cent or more of the allowances recommended for any nutrient with the exception of vitamin A and ascorbic acid. Among Control patients, 52 per cent had good supplies of vitamin A and 51 per cent of ascorbic acid, but slightly smaller percentages of the Instructed patients had diets rated good for these nutrients. Only one-fifth of the women in both groups reported diets with a good calcium content; and 54 per cent of the Instructed and 48 per cent of the Control patients had diets rated poor for calcium. More diets were poor in calcium than in any other nutrient, but almost as many women in both groups had poor supplies of riboflavin and ascorbic acid.

The percentages of first diets of the Instructed and Control patients for which the general or total rating was good, fair, or poor are shown in Table 5. That there was little difference in

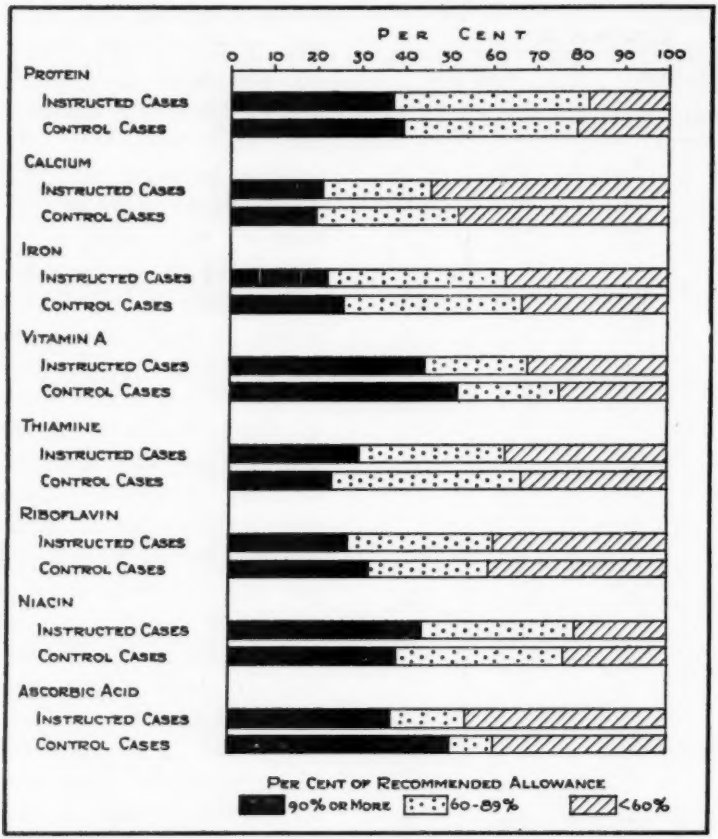


Fig. 1.—Percentages of women in each study group for whom estimated amounts of each of eight nutrients in diets reported at first interview furnished specified percentages of the recommended allowances for pregnancy.

the quality of the one-day diets between the two groups of patients is again evident. Less than one-fifth of either group reported diets at the first interview which were generally good in quality, while 49 per cent of the Instructed and 43 per cent of the Control patients reported diets classified as poor.

The weekly amounts of milk, of eggs, and of foods rich in ascorbic acid estimated for the first diet histories are shown in

Rating for General Quality of Diet[1]	Per Cent of Total for First Diet Record		Per Cent of Total for Final Diet Record	
	Instructed	Control	Instructed	Control
Total	100.0	100.0	100.0	100.0
Good	16.0	18.5	37.0	28.4
Fair	34.6	38.3	32.1	35.8
Poor	49.4	43.2	30.9	35.8
Total Number	81	81	81	81

[1] Quality rating based on composite classification of 8 nutrients. *See* page 125.

Table 5. Percentage distributions of women in each study group with diets rated good, fair, or poor.

Table 6. There was no difference between the two groups in the weekly consumption of foods rich in ascorbic acid and the difference in the amounts of milk was small. But there was a significant difference between Instructed and Control patients

Table 6. Percentage distributions according to weekly use of milk, of eggs, and of ascorbic acid foods for women in each study group at first and final interviews.

Amounts of Specified Food	Per Cent of Total for First Record		Per Cent of Total for Final Record	
	Instructed	Control	Instructed	Control
Milk—Quarts				
Total	100.0	100.0	100.0	100.0
7 or more (Good)	24.7	30.9	39.5	33.3
3—6 (Fair)	43.2	34.6	44.4	39.5
Less Than 3 (Poor)	32.1	34.6	16.1	27.2
Eggs—Number				
Total	100.0	100.0	100.0	100.0
7 or More (Good)	33.3	33.3	34.6	23.5
3—6 (Fair)	45.7	22.2	39.5	45.7
Less Than 3 (Poor)	21.0	44.4	25.9	30.9
Foods Rich in Ascorbic Acid—Servings				
Total	100.0	100.0	100.0	100.0
14 or More (Good)	22.2	22.2	27.2	18.5
7—13 (Fair)	33.3	33.3	44.4	33.3
Less Than 7 (Poor)	44.4	44.4	28.4	48.2
Total Number	81	81	81	81

in the number of eggs reported consumed in one week.[8] One-third of the women in each group reported a weekly intake of seven or more eggs; but 44 per cent of the Control compared with 21 per cent of the Instructed patients reported that they ate less than three eggs in the week before they registered at the clinic.

The three food groups used for the weekly diet do not afford a precise comparison with the estimated amounts of nutrients in the one-day diets, but it is of some interest to point out that the protein content of the one-day diets reported at the first interview was very similar for the two groups. This suggests that many Control patients may have compensated for the lack of eggs in their diets with a choice of other protein foods.

The weekly consumption of milk gives a somewhat more favorable picture for both groups than does the estimated content of calcium in the one-day diets, but it is not unlike the estimated content of riboflavin.

Fourteen servings a week of foods with a good ascorbic acid content should furnish approximately the recommended allowance for pregnancy of this nutrient. Only 22 per cent of the women in each group reported fourteen or more servings of these foods compared with 37 and 51 per cent of the Instructed and Control patients, respectively, whose one-day diets supplied 90 per cent or more of the allowance. But the proportion of women with less than seven servings (44 per cent) was similar to the proportion with less than 60 per cent of the recommended allowance of ascorbic acid in the one-day diets.

One-day diet histories for 723 patients registered in prenatal clinics in New York City were studied by the New York State Nutrition Survey (4). The estimated amount of protein in these one-day diets is comparable with protein esti-

[8] The chi-square test for significance between the two Study groups in the percentage distribution of weekly diets according to numbers of eggs gave a X^2 value of 13.37 with the probability of less than 1 in 100 that the observed or a greater difference would occur by chance alone.

mated for this Study, though classifications used differ slightly. The amounts of milk and servings of foods high in ascorbic acid reported in one-day diets are not necessarily comparable with the average daily intake for the Morrisania patients based on weekly consumption, but it is of interest to compare the results of these two studies.

In the State Nutrition Survey, 26 per cent of the prenatal patients reported one-day diets which furnished 75 gms. or more of protein and 39 per cent had diets with less than 55 gms. Among patients at Morrisania in this Study, 38 per cent obtained 76.5 gms. or more of protein and 20 per cent 50 gms. or less from the one-day diet. Thus, a higher proportion of the Morrisania group had adequate amounts of protein.

A milk consumption of one quart or more in one day was reported by 16 per cent of women in the State Survey compared with 28 per cent in this Study who reported seven quarts or more in one week. The proportions in the two studies that had less than a pint a day were fairly similar; 39 per cent in the State Survey used less than two cups daily and 33 per cent in the Morrisania group used less than three quarts in a week.

The classifications for daily servings of foods rich in ascorbic acid used in the State Study were two servings or more, one serving, and none. The percentages of the one-day diets in these three classifications were the same as percentages of weekly diets in the Morrisania Study, which included fourteen or more servings, seven to thirteen servings, and less than seven servings of foods rich in ascorbic acid.

Final Diet Records

Comparison of Two Study Groups. The percentages of Instructed and Control patients whose one-day diets reported at the final interview were estimated as furnishing good, fair, or poor amounts of eight nutrients relative to the recommended allowance for pregnancy of each nutrient are shown in Table 4 and Figure 2.

There was evidence of some improvement in the later diets

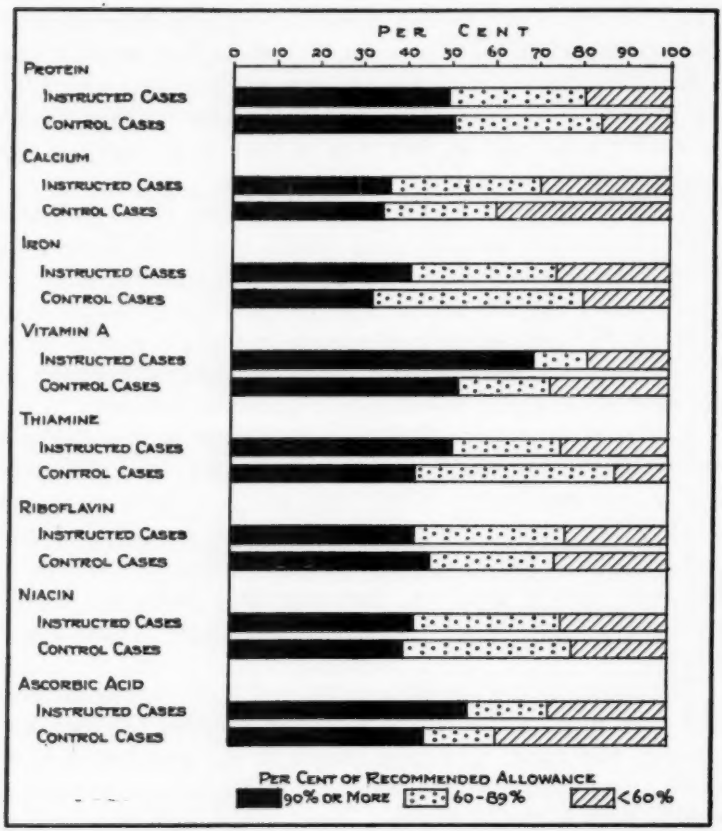


Fig. 2. Percentages of women in each study group for whom estimated amounts of each of eight nutrients in diets reported at final interview furnished specified percentages of the recommended allowances for pregnancy.

of women in both study groups although for many patients the estimated amounts of the various nutrients were still at the fair or poor level. The differences between the groups were small and the women who had been instructed, most of them twice, did not report diets that were consistently better than diets of the Control patients.

The diets of relatively more Instructed than Control patients furnished good supplies of iron, vitamin A, thiamine, and

ascorbic acid, but the difference between the two groups was significant statistically for vitamin A alone (P = .02–.03).[9] For these four nutrients the percentages of diets furnishing 90 per cent or more of the allowances were 8 to 17 per cent higher among Instructed than among Control patients; and for the other four nutrients the groups were nearly equal in the percentages with good amounts of the nutrients.

Smaller percentages of the Instructed than of the Control group had diets with less than 60 per cent of the allowances for vitamin A, for ascorbic acid, and for calcium; and higher percentages of the Instructed patients had diets poor in thiamine and iron. A relatively high proportion of the Control group had diets with fair amounts of thiamine and iron, and the proportions with good and with poor supplies of these nutrients were smaller than among Instructed patients.

The general rating on quality of diets based on all eight nutrients indicated only a slight superiority for the Instructed group at the final interview as shown in Table 5 and Figure 3. In the Instructed group, 37 per cent of the diets were classified as good and 31 per cent as poor; and in the Control group, 28 per cent of the diets were good and 36 per cent were poor. The differences between the two groups were not significant.

The weekly amounts of milk, eggs, and foods rich in ascorbic acid reported at the final interview by women in the two study groups are shown in Table 6 and Figure 4. For these foods the weekly diets of Instructed patients were consistently better than those of the Control group in that relatively more diets were rated good and fewer rated poor. The difference between the two groups of patients was statistically significant, how-

[9] With 81 women in each group, the difference between any two percentages that is twice its standard error ($P < .05$) varies from about 12 per cent difference between the lowest percentage values in Table 4 to about 15 per cent difference between the highest percentages. For the final diets, a significant difference between the Instructed and Control groups is found only for vitamin A, for which a higher percentage of Instructed patients had 90 per cent or more of the allowance, and for thiamine for which a higher percentage of Instructed patients had less than 60 per cent of the allowance.

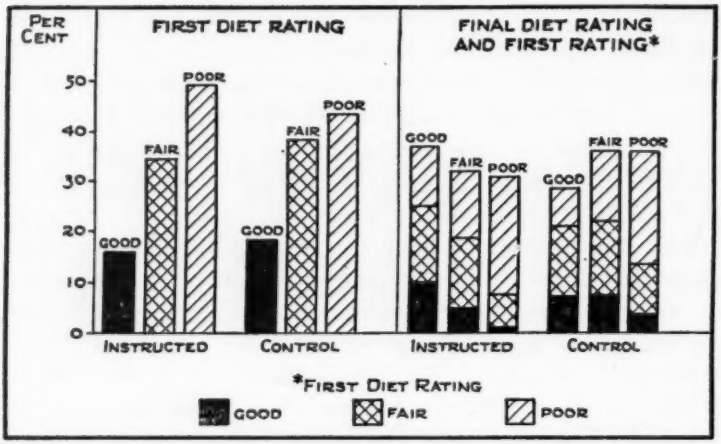


Fig. 3. The percentages of women in each study group with diets rated good, fair, or poor at the first and final interviews; and the first diet ratings for those with each specified final rating.

ever, only for foods rich in ascorbic acid, and the significance lay in the difference between the percentages of Instructed and Control patients who reported less than seven servings of these foods.[10] Twenty-eight per cent of the Instructed and 48 per cent of the Control group reported weekly diets with less than seven servings of foods rich in ascorbic acid.

In summary, diet histories taken at the final interview did not indicate that the Instructed group had significantly better diets than the Control group. However, a slightly greater proportion of the Instructed than of the Control group had diets with a general rating of good, had diets furnishing 90 per cent or more of the allowance for iron, vitamin A, thiamine, and ascorbic acid, and had adequate amounts of milk, eggs, and ascorbic acid-rich foods in the weekly diet.

Change From First to Final Diet. When the change in

[10] A X^2 value of 6.74 was obtained when the hypothesis was tested that the weekly servings of foods rich in ascorbic acid was independent of the groupings used for the patients (Instructed and Control), with a probability of 4 per cent that the differences observed would occur by chance. The difference between percentages of Instructed and Control patients who reported less than seven servings was highly significant with a probability of less than 1 per cent that it was a chance occurrence.

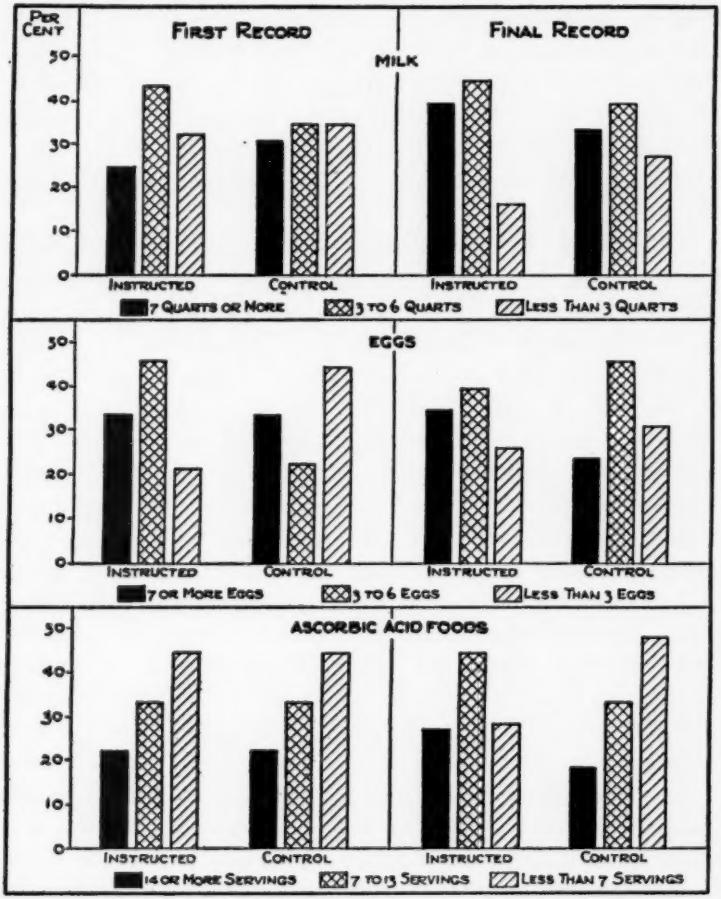


Fig. 4. The percentages of women in each study group whose weekly use of milk, of eggs, and of ascorbic acid foods was at specified levels.

consumption levels between the first and final diet records is compared for the two study groups, improvement in diets of Instructed patients is definitely more frequent than in diets of Control patients. Initially, the Instructed group had somewhat poorer diets though it did not differ significantly from the Control group.

For the Instructed group, a significant change[11] to a larger percentage of diets at the good level and a smaller percentage at the poor level is found for calcium, iron, vitamin A, thiamine, and ascorbic acid. For riboflavin the change is of borderline significance (P .05–.06). For the Control group there was a significant improvement only in the thiamine content of the final diets ($P < .01$).

The increase in the percentage of final diets given a general rating of good over the percentage rated good for the first diet was very significant for the Instructed group ($P < .01$) but was not significant statistically for the Control group ($P > .20$).

In the Instructed group there was a significant increase in the amounts of milk reported for one week, but there was no significant change in the use of milk by the Control group. The weekly consumption of eggs reported by Control patients changed significantly at the final interview but, although fewer women reported less than three eggs per week, there were fewer also using seven or more eggs. The Instructed group had no significant change in consumption of eggs and neither group changed significantly in the use of ascorbic acid-rich foods, although among the Instructed patients the percentage of patients who reported less than seven servings decreased from 44 per cent at first interview to 28 per cent at the final interview.

Final Diet Ratings Related to First Diets. Although the specific foods eaten from day to day vary, a one-day diet may afford a fair index of an individual's dietary pattern or of the general consumption level within the broad classifications used in this analysis. It is of interest to examine the frequency with which individuals shifted from one classification to another and the nature of these shifts.

For women whose first diets were in a specific classification

[11] The chi-square test for significance between the threefold distributions at the first and final interview was applied to each nutrient. The probability that the observed difference in the distributions would arise from chance alone was: for calcium, $< .01$; for vitamin A, $< .01$; and for iron, thiamine, and ascorbic acid, .02–.05.

for general quality, the percentages that were rated at each level on the final diet are shown in Table 7.

Among patients reporting first diets with a general rating of good, 61 per cent of the Instructed group compared with 40 per cent of the Control group reported final diets which were rated good. For women with an initial diet rating of poor, approximately one-half in each study group reported final diets classified as poor. Slightly higher percentages of Instructed than of Control patients with initial diets rated fair or poor reported final diets rated good. The greater increase in the number with good final diets among Instructed patients is due in part to a larger proportion of those with initially good diets maintaining that level of consumption, but even more to the greater number who improved their diets from poor quality to good. In Figure 3 the percentages of patients with final diet ratings at each level are subdivided according to the percentages of the total Study group that had the specified initial diet rating.

Table 7. Percentage distributions of final diets by three classifications based on eight nutrients for women whose first diets were in a specific classification.

First Diet Rating[1] and Study Group	Per Cent of Women With Specified Rating for Final Diet				Number With Specified Rating[1] for Final Diet			
	Total	Good	Fair	Poor	Total	Good	Fair	Poor
Total								
Instructed	100.0	37.0	32.1	30.9	81	30	26	25
Control	100.0	28.4	35.8	35.8	81	23	29	29
Good Diet								
Instructed	100.0	61.5	30.8	7.7	13	8	4	1
Control	100.0	40.0	40.0	20.0	15	6	6	3
Fair Diet								
Instructed	100.0	42.8	39.3	17.9	28	12	11	5
Control	100.0	35.5	38.7	25.8	31	11	12	8
Poor Diet								
Instructed	100.0	25.0	27.5	47.4	40	10	11	19
Control	100.0	17.1	31.4	51.4	35	6	11	18

[1] A good rating was given to diets with 90 per cent or more of allowance for five or more nutrients and less than 60 per cent of allowance for no nutrients; a poor rating was given to any diet with less than 60 per cent of allowance for three or more nutrients; all other diets were rated fair.

Amounts of Specified Foods at First Report and Study Group	Per Cent of Women With Specified Weekly Consumption Reported on Final Record			
	Total	Good	Fair	Poor
Milk, Quarts—Total				
Instructed	100.0	39.5	44.4	16.1
Control	100.0	33.3	39.5	27.2
7 or More (Good)				
Instructed	100.0	70.0	30.0	0
Control	100.0	60.0	24.0	16.0
3 to 6 (Fair)				
Instructed	100.0	34.3	48.6	17.1
Control	100.0	32.1	50.0	17.9
Less Than 3 (Poor)				
Instructed	100.0	23.1	50.0	26.9
Control	100.0	10.7	42.9	46.4
Eggs, Number—Total				
Instructed	100.0	34.6	39.5	25.9
Control	100.0	23.5	45.7	30.9
7 or More (Good)				
Instructed	100.0	48.1	37.0	14.8
Control	100.0	33.3	48.2	18.5
3 to 6 (Fair)				
Instructed	100.0	35.1	43.2	21.6
Control	100.0	16.7	38.9	44.4
Less Than 3 (Poor)				
Instructed	100.0	11.8	35.3	52.9
Control	100.0	19.4	47.2	33.3
Foods Rich in Ascorbic Acid, Servings—Total				
Instructed	100.0	27.2	44.4	28.4
Control	100.0	18.5	33.3	48.2
14 or More (Good)				
Instructed	100.0	27.8	50.0	22.2
Control	100.0	33.3	38.9	27.8
7 to 13 (Fair)				
Instructed	100.0	29.6	40.7	29.6
Control	100.0	29.6	33.3	37.0
Less Than 7 (Poor)				
Instructed	100.0	25.0	44.4	30.6
Control	100.0	2.8	30.6	66.7

Table 8. Weekly consumption of milk, of eggs, and of foods rich in ascorbic acid reported at final interview by women reporting various amounts per week at first interview.

The weekly consumption of milk, eggs, and foods rich in ascorbic acid reported at the final interview is shown in Table

Number of Women With Specified Weekly Consumption Reported on Final Diet			
Total	Good	Fair	Poor
81	32	36	13
81	27	32	22
20	14	6	0
25	15	6	4
35	12	17	6
28	9	14	5
26	6	13	7
28	3	12	13
81	28	32	21
81	19	37	25
27	13	10	4
27	9	13	5
37	13	16	8
18	3	7	8
17	2	6	9
36	7	17	12
81	22	36	23
81	15	27	39
18	5	9	4
18	6	7	5
27	8	11	8
27	8	9	10
36	9	16	11
36	1	11	24

8 for women classified according to use of these foods at the first interview.

Almost three-fourths of the Instructed group with less than three quarts of milk per week initially showed some improvement at the final interview and 23 per cent of them compared with 11 per cent of the Control group reported an increase to seven or more quarts of milk. Among those who said they had the equivalent of seven or more quarts of milk at the first interview, 70 per cent of the Instructed cases reported as much and none reported less than three quarts at the final interview; 60 per cent of the Control group with the same initial classification also maintained a good weekly consumption of milk, but 16 per cent reported that they had had less than three quarts of milk weekly at the final interview. For all patients who used less than seven quarts of milk initially, 30 per cent of those in the Instructed group and 21 per cent in the Control group reported seven quarts or more at the final interview.

The consumption of eggs seemed to be variable and changes between the two diet histories for the two study groups did not have a consistent pattern. About one-half of the Instructed and only one-third of the Control group reporting a weekly intake of seven or more eggs at the first interview had as many at the final interview; and 35 per cent of the Instructed compared with 17 per cent of the Control group increased the number to seven or more from an initial use of three–six eggs. But among women reporting less than three eggs weekly for the first record, 53 per cent of the Instructed and 33 per cent of the Control patients continued in this class. As indicated previously, significantly more Control than Instructed patients reported less than three eggs at the first interview, and the majority of these Control patients increased their use of eggs.

The number of weekly servings of foods rich in ascorbic acid reported at the final interview showed very little relationship to that reported earlier. One exception was the high percentage (67 per cent) of women in the Control group with an initial use of less than seven servings who continued to have so few servings. Among Instructed patients who reported less than seven weekly servings initially, 25 per cent had fourteen or more servings on the final record compared with 3 per cent of the Control patients. This difference between the two study groups is highly significant ($P = < .01$).

It is evident that between the two periods the diets had changed for many of these women; some were better and some were poorer in spite of a general tendency toward higher levels of consumption. But it is also true that the classifications on the final diets remained the same as those on the initial diet for many.

A crude statistical score for a one-day diet based on the ratings for eight separate nutrients was utilized to obtain a quantitative measure of change in the individual diets. A value of 3 was assigned to a nutrient if the estimated amount was 90 per cent or more of the recommended allowance for that nu-

trient; a value of 2 for 60 to 89 per cent; and a value of 1 for less than 60 per cent of the allowance. The values for eight nutrients were summed to obtain one figure ranging from 8 to 24 for a total diet score. For each individual the score on the first diet was subtracted from that on the final diet, and a plus difference represented improvement.

The average difference in the diet scores for Instructed patients was +2.11, standard error ± 0.55; for Control patients it was +1.21, standard error ± 0.55. The increase for both groups is statistically significant; that for the Instructed group is greater but not significantly greater.

That the dietary advice given to the patients in the Instructed group was effective in changing the diets of some women seems likely. For those who initially reported diets of poor quality and of poor weekly supplies of milk and of foods rich in ascorbic acid, the generally larger proportions of Instructed than of Control patients with a rating of good on their final diets strongly suggest a response to the dietary instructions given. In addition, relatively more of the Instructed patients maintained good diets when their first diets had been good, and fewer reported final diets which were rated poor.

However, it is apparent that many women given instruction did not greatly modify their diets. The choice of foods included in the dietary of an individual is influenced by many things. Habits of eating become fixed. The availability of specific foods and sufficient money to purchase the food are immediate and urgent factors governing the selection of food for many people. Of possible importance, also, was the fact that many women in this Study did not have separate households but lived with relatives or friends. At the first interview, 47 per cent in the Instructed group and 35 per cent in the Control group were members of other households.

Diets After Advice by Clinic Physician. There was a record of diet advice from the clinic doctor before the final diet interview for thirty-six Instructed and thirty-eight Control patients. The advice given usually followed a rapid gain in weight and,

Rating for Final One-Day Diets Based on 8 Nutrients[1]	Per Cent With Specified Diet Rating for Each Group			
	Instructed Group		Control Group	
	With Diet Advice In Clinic	No Diet Advice In Clinic	With Diet Advice In Clinic	No Diet Advice In Clinic
Total	100.0	100.0	100.0	100.0
Good	25.0	46.7	26.3	30.2
Fair	27.8	35.6	34.2	37.2
Poor	47.2	17.8	39.5	32.6
Total Number	36	45	38	43

[1] *See* page 125.

Table 9. General rating on diet quality for records taken for the Study after patient had received some diet advice from a clinic physician compared with diet records for women with no advice in clinic.

in so far as it was reported, was generally restrictive. The patient was told to use less of such items as starches, sweets, fried foods, fluids, and salt. For some cases the doctor had recorded "diet given" or "diet instructions given" on the clinic record, and a few women reported that they had been told to eat plenty of vegetables, fruit, lean meat, and occasionally specific quantities of milk. As a rule, however, neither the clinic record nor the report from the patient indicated any positive advice concerning foods to be eaten. If the patient had been told what she should eat, the doctor did not record the information and the patient rarely reported it.

The final diets of the patients who previously were advised by the clinic physician and of those without any record of such advice were compared for both study groups. The data are shown in Table 9 for the general ratings.[12]

For Control patients the groups with and without clinic advice on diet differed only slightly in the proportions of women

[12] For both study groups there was little difference in the weekly consumption of the three food groups between those who received advice in the clinic and those who reported none. An exception was the use of milk by Control patients. In this group only 16 per cent of the women who received dietary advice from the clinic reported less than three quarts of milk weekly compared with 36 per cent of those with no dietary advice from the clinic. The difference between the two percentages is significant ($P = .04$–$.05$) and suggests that women with low intake of milk had been encouraged to increase their consumption of milk.

with good, fair, or poor general ratings on the one-day diets. But for the Instructed patients there were marked differences between the two groups. Forty-seven per cent of the patients who had received diet advice from the clinic doctor before the final interview reported diets which were rated poor in quality; and only 18 per cent of those without such advice reported diets which were rated poor. Furthermore, the diets were rated good for 47 per cent of the women with no clinic advice compared with 25 per cent of those who had received advice. These group differences are significant; the chi-square value is 8.53 and P is .01–.02.

Moreover, for Instructed patients with no dietary advice from the clinic physician, the over-all ratings on the final diets were better than those of Control patients. The difference between the distribution by quality of diet for this part of the Instructed group and that of the total Control group has borderline significance statistically; the chi-square value is 5.98, P is .05.

These data for the Instructed patients are not easily interpreted. Admittedly, the numbers of women with advice from the clinic physician and without advice are small. Also, those given advice were advised because of a condition noted by the doctor, and this may have selected women with poor dietary habits.[13] On the other hand, a similar difference is not found for members of the Control group. Regardless of what advice the doctor may have given, the patients' reports indicated that they were impressed with the advice to exclude foods much more than with any advice as to what foods should be eaten. The result apparently was a restriction in food intake without proper substitutions of foods to obtain the needed nutrients without high caloric intake, in spite of dietary instruction given by the nurse or nutritionist. One may conclude that closer cooperation between the physician and diet instructor

[13] A comparison of first diets reported by women who received diet advice in the clinic with first diets for women who were not advised in clinic showed no significant difference either for those in the Instructed group or those in the Control group.

is desirable and that the instruction is more likely to be effective if it has definite support by the physician.

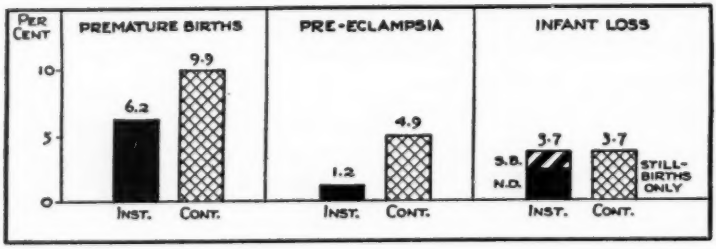
Outcome of Pregnancy by Study Groups

Prematurity has been judged in this analysis on the basis of weight alone, and all babies weighing 5 pounds 8 ounces or less at birth were considered premature. Among 162 women included in the Study, thirteen or 8 per cent were delivered of premature babies. Five were born to the Instructed patients and eight to the Control, an incidence of prematurity of 6.2 per cent for the former and 9.9 for the latter, as shown in Fig. 5.

The neonatal history of the babies born to patients in the Study was obtained for the period of hospital residence only, and during this time there was no difference in infant loss between the two study groups. Two infant deaths one of which was a premature baby, and one stillbirth occurred among the Instructed group; and three stillbirths, two of which were premature, occurred among Control patients, an infant loss of 3.7 per cent for the women included in the Study.

A major complication which may occur during pregnancy is toxemia. While none of the women included in the Study became eclamptic, five were diagnosed as pre-eclamptic. Four of them were admitted to the hospital for stabilization before the onset of labor but none of these women were delivered prematurely. Only one case of pre-eclampsia occurred among the Instructed patients (1.2 per cent) compared with four among the Control (4.9 per cent).

Fig. 5. The incidence of premature birth, pre-eclampsia, and infant loss in each study group.



If patients with premature labor and pre-eclampsia are added together, the incidence of one or the other is 7.4 per cent for Instructed patients and 14.8 for Control patients.[14] The more favorable incidence of prematurity and of pre-eclampsia among Instructed patients suggests a probable benefit derived from the dietary education given to these women, but on the basis of eighty-one patients in each group, the differences are not statistically significant.

Relationship of Diet to Outcome of Pregnancy

The relationship of the quality of the diet and the outcome of pregnancy has been evaluated for the Instructed and Control patients combined since there was little difference in the numbers in each group with diets classified as good, fair, and poor, and since presumably any effect of diet on the outcome of pregnancy would be independent of the instruction which may have influenced the diet.

The incidence of prematurity and pre-eclampsia and of the two combined is shown for all patients according to the composite nutrient rating for quality of the first and final one-day diets in Table 10.

There was no significant relationship between the incidence of prematurity and the quality of the diets reported at the first interviews. But there was a rather marked, although not statistically significant, association between pre-eclampsia and the quality of the first diet. No cases of pre-eclampsia were diagnosed among women with generally good diets and four of the five diagnosed cases occurred among women whose one-day diets were classified as poor at the first interviews.

The quality of the final diets shows a very definite association with the incidence of both prematurity and pre-eclampsia. Thirteen per cent of the patients with poor diets were delivered of premature babies compared with approximately 5.5 per cent of the patients with good or fair diets. Pre-eclampsia

[14] Among the fourteen Instructed and fourteen Control women in the Study excluded from the analyses of results because of acute or chronic complications (*see* Table 1), there was one premature birth and one case of pre-eclampsia in each group.

Rating for One-Day Diet[1]	Rate per 100 Women			Number of Cases		Number of Women
	Prematurity or Pre-eclampsia	Prematurity	Pre-eclampsia	Prematurity	Pre-eclampsia	
First Diet—Total	11.1	8.0	3.1	13	5	162
Good	10.7	10.7	0	3	0	28
Fair	11.9	10.2	1.7	6	1	59
Poor	10.7	5.3	5.3	4	4	75
Final Diet—Total	11.1	8.0	3.1	13	5	162
Good	5.7	5.7	0	3	0	53
Fair	9.1	5.5	3.6	3	2	55
Poor	18.5	13.0	5.6	7	3	54

[1] Based on estimated amounts of eight nutrients. *See* page 125.

Table 10. Incidence of premature birth and of pre-eclampsia among women classified according to the rating of quality of the reported diet.

was diagnosed for 5.6 per cent of the women with poor diets, and again, no cases occurred among the women whose diets were classified as good.

These differences are not significant statistically for either prematurity or pre-eclampsia alone. But when the two are combined the incidence of 18.5 per cent among women with diets rated poor is significantly higher than among women whose diets were rated good (P = .04–.05); and also it is significantly higher than the incidence among women whose diets were classified as either good or fair.[15]

The association between the quality of the one-day diets of the Morrisania patients and the incidence of premature birth and pre-eclampsia is in agreement with the results of other studies on the relationship of diet to the outcome of pregnancy. In a study of nutrition and pregnancy at the Boston Lying-In Hospital, Burke, Beal, Kirkwood, and Stuart reported no cases of premature birth nor of pre-eclampsia among thirty-one women whose prenatal diets had been classified as "good or excellent" (5), while among thirty-six women with "poor to very poor" diets, they reported eight cases of premature birth

[15] For good and fair groups combined, the incidence is 7.4 per cent and the probability is 3 to 4 per cent that the observed or a greater difference from the incidence for the group with poor diets would occur by chance.

and sixteen cases of pre-eclampsia. In a special study of clinic patients in the Toronto General Hospital, Ebbs, Tisdall, and Scott (6) found an incidence of premature birth of 8 per cent for 120 women with poor prenatal diets and an incidence of only 3 per cent for 170 patients with good diets. Pre-eclampsia or toxemia was diagnosed for approximately 13 per cent of the former group compared with 8 per cent of the latter.

Pregravid Weight and Outcome of Pregnancy

It is well known that the obese woman has an increased risk of toxemia in pregnancy and it has recently been shown that the underweight woman has an increased risk of both toxemia and premature labor (7). The relation of the immediate pregravid weight status to premature births and to pre-eclampsia among women in this Study, therefore, is of interest.

Although the reported pregravid weight undoubtedly is subject to error, it permits a reasonably accurate classification of the women as to their weight status relative to height. The average weight by age and height used by the Medico-Actuarial Mortality Investigation (8) was taken as the standard and the percentage deviation of weight from this standard was computed for each patient. For women over 25 years of age, the average weight at age 25 years was taken as standard.

In Table 11, the incidence of premature birth and of pre-eclampsia for women of different pregravid weight status is shown. Rates are computed only for the combined population of the Instructed and Control groups because of the small numbers; and only three weight classes are used.[16]

The five cases of pre-eclampsia were not concentrated in any pregravid weight class and there is no definite association between the incidence of pre-eclampsia and weight status.

The premature birth rate was 15 per cent among women 5 per cent or more underweight compared with an incidence of 7 per cent for women of approximately standard weight and

[16] There were fifteen women classified as 15 per cent or more underweight, five in the Study and ten in the Control group; one of the ten in the Control group had a premature baby and there were no cases of pre-eclampsia in either group.

Pregravid Weight Per Cent Overweight or Underweight	Rate Per 100 for All Women	Number of Women[1]			Number of Cases		
		Total	Inst.	Cont.	Total	Inst.	Cont.
	Premature Births						
Total	8.2	159	80	79	13	5	8
+5% or More	1.9	54	29	25	1	0	1
+ or − 0 to 4%	6.7	45	24	21	3	0	3
− 5% or More	15.0	60	27	33	9	5	4
	Pre-Eclampsia						
Total	3.1	159	80	79	5	1	4
+ 5% or More	3.7	54	29	25	2	1	1
+ or − 0 to 4%	2.1	54	24	21	1	0	1
− 5% or More	3.3	60	27	33	2	0	2

[1] Height was unknown for one woman in the Instructed group and for two in the Control group.

Table 11. Incidence of premature births and pre-eclampsia among women classified according to percentage deviation of pregravid weight from the age-height weight standards.

2 per cent for women 5 per cent or more overweight. Thus, there was a marked association between weight status and the frequency of premature births. The rate for underweight women is significantly higher than that for the normal and overweight classes combined ($P = .01–.02$).

The underweight woman has little or no nutritional reserves to meet the added demands of pregnancy. It seems reasonable to conclude that her greater risk of premature labor is associated with this lack of reserves and that fully adequate intake of nutrients to support foetal growth and her own tissue status is important to a successful pregnancy.

Summary

The results of an experiment with individual diet instruction to nulliparous women attending prenatal clinic at Morrisania Hospital are reported.

For 162 women, one-day diet histories taken at first visit to clinic and again in the third trimester of pregnancy were analyzed. Eighty-one women received diet instruction from a nurse or nutritionist at first interview and most of them at one other visit before the final diet history was taken; and

eighty-one (Control group) had no diet instruction. Amounts of eight nutrients in the diet were estimated: namely, protein, calcium, iron, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid; and on the basis of these nutrients the diets were rated as good, fair, or poor. In addition, for the week preceding each interview, consumption of milk, of eggs, and of foods rich in ascorbic acid was tabulated.

Diets of the Instructed group and of the Control group were very similar at first interview. Deficiencies were greatest for calcium, riboflavin, and ascorbic acid. The general rating was good for slightly less than one-fifth of the diets reported by women in each study group; the rating was poor for 49 and 43 per cent of the Instructed and Control groups, respectively.

Diets at the final interview showed an increase in the food consumed by women in both groups. At this time, 37 per cent in the Instructed group and 28 per cent in the Control group had diets rated good; and 31 per cent and 36 per cent, respectively, had diets rated poor. Statistically, these differences are not significant. However, the increase in the percentage of good diets over the percentage at the first interview is significant for Instructed patients and not for the Controls. Greater improvement by Instructed patients is found for intake of calcium, iron, vitamin A, thiamine, and ascorbic acid.

Five premature babies were born to women in the Instructed group compared with eight to those in the Control group.

One case of pre-eclampsia occurred in the Instructed group and four in the Control group.

The incidence of both prematurity and pre-eclampsia for the 162 women (Instructed and Control groups) varied inversely with the quality of the diet at the final interview; and pre-eclampsia but not prematurity was associated with quality of the diet at the first interview. For prematurity and pre-eclampsia combined, the incidence was 18.5 per cent for women with poor final diets as against 7.4 per cent for those with fair or good diets, and the difference is statistically significant.

Among women who were 5 per cent or more underweight be-

fore pregnancy, the premature birth rate was 15 per cent and significantly higher than for normal and overweight women.

This Study adds to previous evidence that diets of prenatal patients affect the course and outcome of pregnancy and indicates that diets of women of low income can be improved by individual instruction. Nutrition teaching, therefore, seems a desirable preventive procedure for prenatal clinics.

Acknowledgment

This experiment in teaching diet to prenatal patients was proposed and sponsored by the Bronx Nutrition Committee of which Miss Mary Ross and Mrs. Emily K. Stamm were chairmen during the planning period. In 1947 the Committee was a part of the Bronx Council of Social Welfare but since 1948 has been affiliated with the Food and Nutrition Division of the Health Council of Greater New York. A survey of the teaching in prenatal clinics in the City Hospitals in the Bronx was made by nutritionists of the New York City Department of Health and the Community Service Society who were members of the Nutrition Committee. It was found that not more than 4 per cent of the prenatal registrants of Fordham, Lincoln, and Morrisania Hospitals were given any instruction on nutrition, and that these few patients received but one over-all lecture on food values lasting one hour, rather than getting any help with their individual problems. Following this survey, two members of the Nutrition Committee discussed the problem with the Commissioners of Health and of Hospitals and were granted permission to conduct a nutrition teaching demonstration in a Bronx city hospital. Dr. Isabella Haskell, then Health Officer in the Health Department's Westchester Pelham Health Center in the Bronx, an interested member of the Nutrition Committee, cleared with Dr. Nathan Smith and other staff members of Morrisania Hospital for needed cooperation for a nutrition teaching experiment in the prenatal clinic there. While the Commissioners of Health and of Hospitals were interested and willing to have the demonstration in one of the city hospitals neither Department could spare the time of their personnel for the experiment. The Community Service Society of New York, therefore, made the services of a nurse and a nutritionist available for the demonstration.

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Appendix Table 1. Daily allowances of eight nutrients recommended by the Food and Nutrition Board, National Research Council, in 1948 for the latter half of pregnancy, and the 90 per cent and 60 per cent levels used for classifying diets.

NUTRIENT	AMOUNT PER DAY	90 PER CENT OF ALLOWANCE	60 PER CENT OF ALLOWANCE
Protein, gr.	85.00	76.50	51.00
Calcium, gr.	1.50	1.35	.90
Iron, mg.	15.00	13.50	9.00
Vitamin A, I.U.	6,000.00	5,400.00	3,600.00
Thiamine, mg.	1.50	1.35	.90
Riboflavin, mg.	2.50	2.25	1.50
Niacin, mg.	15.00	13.50	9.00
Ascorbic Acid, mg.	100.00	90.00	60.00

Appendix Table 2. The equivalent quarts of milk for various milk products, and equivalent servings of foods rich in ascorbic acid for fruits and vegetables used in estimating total amounts reported for weekly diets.

AMOUNTS OF SPECIFIED FOODS	EQUIVALENT QUARTS OR SERVINGS
Milk	*Quarts*
1 Small Can	0.3
1 Tall Can	0.9
Ice Cream, 1 Pint	0.3
Cheese, 2 Oz. or 2 Sl.	0.3
Foods Rich in Ascorbic Acid	*Servings*
Orange, 1; Juice, ½ Cup	1
Grapefruit, ½; Juice, ½ Cup	1
Lemon, 1	1
Strawberries, 1 Serving	1
Collards, Kale, etc. (Except Spinach), ½ Cup	1
Broccoli, ½ Cup	1
Tomato, 1	½
Cantaloupe, ¼	½
Watermelon, 1 Sl.	½
Pineapple, 1 Serving; Juice ½ Cup	½
Cabbage, Cauliflower, Brussels Sprouts, ½ Cup	½
Green Pepper, ½ Cooked	½
Spinach, 1 Serving	½

SOCIAL AND PSYCHOLOGICAL FACTORS AFFECTING FERTILITY

XVI. FERTILITY RATES AND FERTILITY PLANNING BY CHARACTER OF MIGRATION[1]

J. F. KANTNER AND P. K. WHELPTON

THIS study deals with some of the relationships between physical mobility and patterns of reproductive behavior. Specifically, frequency of movement is studied in relation to (a) number of live births and (b) the extent to which fertility is planned. In addition, the relationship of the size and location of the migrant's community of origin to his fertility and fertility planning is investigated. Some attempt will also be made to deal with the interaction among these variables.

As formulated by the Committee[2] the nature of these relationships is not specified. Perhaps a fair amount of agreement could be obtained to the following statement:

Frequency of movement is inversely related to the size of planned families and directly related to the extent of fertility planning.[3] [Hypothesis (a)]

In support of Hypothesis (a) one might point to the secularizing effect of movement on such attitudinal systems as the "large family ideal." Or, approaching the matter somewhat differently, it appears that movement involves certain costs and that these vary directly with the frequency of movement. Other things equal, the restriction of family size and extent of planning would vary directly with the costs and therefore the

[1] This is the sixteenth of a series of reports on a study conducted by the Committee on Social and Psychological Factors Affecting Fertility, sponsored by the Milbank Memorial Fund with grants from the Carnegie Corporation of New York. The Committee consists of Lowell J. Reed, Chairman; Daniel Katz; E. Lowell Kelly; C. V. Kiser; Frank Lorimer; Frank W. Notestein; Frederick Osborn; S. A. Switzer; Warren S. Thompson; and P. K. Whelpton.

[2] Hypothesis 11 of the list originally formulated by the Committee reads as follows: The number, size, and location of communities in which couples have lived affect the proportion practicing contraception effectively and the size of planned families.

[3] "Planned families" and "extent of planning fertility" are explained in footnote 19.

frequency of movement. Obviously the costs of movement are a function of factors besides frequency; both distance and dissimilarity of milieu are undoubtedly involved. To some extent all of these considerations are taken into account when number of moves and size of community or origin are cross tabulated.

The second part of this study investigates the relationship between (a) the size and location of the migrant's community of origin, and (b) fertility and fertility planning. At least two inquiries could be followed up here: (1) How do birth rates and contraceptive practices of migrants differ from those of nonmigrants in the community of destination (Indianapolis)? Related to this is the question of how these behaviors vary within the group of migrants classified by size and location of community of origin. (2) How do the birth rates and contraceptive practices of migrants differ from those of nonmigrants in their communities of origin? For reasons discussed below this question cannot be satisfactorily answered in this study.

The first question, which can be investigated with present data, probes an area in which our knowledge is incomplete. Cities are commonly viewed as consumers and rural areas as suppliers of population. This circulation of population is vital to our scheme of organization. The fertility patterns of populations at various points along the rural-urban continuum are well documented but the fertility patterns of those caught up in the population flow are less well known.[4] In order to focus this part of the investigation two additional hypotheses are set up:

Planned families of urban migrants to Indianapolis are smaller in size than those of nonmigrants in Indianapolis. Planned families of rural migrants to Indianapolis are larger than those of Indianapolis nonmigrants. [Hypothesis (b-1)] Urban migrants to Indianapolis are more effective in fertility planning than Indianapolis nonmigrants. Rural migrants to Indianapolis are less effective in fertility planning than In-

[4] *See* Whelpton, P. K.: NEEDED POPULATION RESEARCH. The Science Press, Lancaster, Pa. 1938. pp. 46–47.

dianapolis nonmigrants. [Hypothesis (b-2)] In the formulation of Hypotheses (b-1) and (b-2) it is recognized that although transition between different environments may tend to depress fertility and encourage effective fertility planning this may not be sufficient to overcome the inertia of habit patterns acquired in the community of origin. Thus it is predicted that high fertility and ineffective fertility planning patterns developed in the rural community will survive the migration process.

One additional hypothesis will be tested. This is: Within the migrant group, the size of the community in which couples lived before coming to Indianapolis is *inversely* related to the the size of planned families and directly related to the extent of fertility planning. [Hypothesis (c)] Although Hypothesis (c) may appear to be self evident, it is conceivable that it might not be true. For example, it is possible that the resistances to movement vary inversely with community size. Thus, it could be that what we might call the marginal encumbrance of children is greater in small than in large communities and leads to the selection of relatively unencumbered (small) families for migration from small communities.

Previous Studies of the Relationship Between Mobility and Fertility

Evidence from previous studies is not in full agreement with Hypothesis (a). Two studies yield a direct relationship, two an inverse relationship, and another no relationship between mobility and fertility. No study relating mobility and fertility planning was found in a survey of the literature. Manschke,[5] using Swiss data for an earlier period, found that migrants generally have higher fertility rates than nonmigrants. This is consistent with a positive correlation between mobility and number of children found by Winkler.[6]

Two different studies made in Baltimore indicate an indirect

[5] Cited in Thomas, Dorothy Swaine: *Research Memorandum on Migration Differentials,* (Bulletin 43) New York, Social Science Research Council, 1938, pp. 320–321.

[6] Ibid. pp. 339–340.

relationship. Luykx[7] shows that for both Negroes and Whites large families tended to be more permanent in the area studied than smaller families. Downes, Collins, and Jackson[8] present data showing that the mean family size is greater for "stable" than for "mobile" families.

Edin[9] found no relationship when a correction was made for the higher percentage of employed wives among the migrants.[10]

In general, the crude definitions of mobility, the apparent lack of controls for such relevant items as age, duration of marriage, ethnic composition, etc. as well as lack of agreement among these studies, justify further inquiry.

Size of Community of Origin and Fertility

Data consistent with the argument in Hypothesis (b-1) may be found in the 1940 Census. Table 1 indicates that interurban migrants in 1940 had lower age-specific fertility ratios at ages under thirty[11] than the more stable of the two groups of nonmigrants (col. 1). The fertility ratios of interurban migrants were lower at all ages than were those of intra-urban "migrants" (col. 2). The "rural-farm to urban" migrants (col. 5) exhibited consistently higher fertility ratios than the more stable group of nonmigrants. The ratios of the "rural-farm to urban" migrants were also higher than those of the intra-urban migrants except in the ages 15–24. This is consistent with studies by Feld[12] who compared the rates of rural-born women in Zurich with Zurich-born women and by Leybourne[13] who

[7] Luykx, H. M. C.: Family Studies in the Eastern Health District, IV. Permanence of Residence with Respect to Various Family Characteristics, *Human Biology*, Vol. 19, No. 3, Sept. 1947, pp. 91–132.

[8] Downes, Jean; Collins, Selwyn D.; and Jackson, Elizabeth H.: Characteristics of Stable and Non-Stable Families in the Morbidity Study in the Eastern Health District of Baltimore, Milbank Memorial Fund *Quarterly*, XXVII, No. 13, July 1949, pp. 260–282.

[9] Thomas, op. cit. p. 92.

[10] This factor is not directly controlled in the present study but is perhaps partially caught up in the control for socio-economic status.

[11] It is fairly well established that the years under thirty are the years of greatest mobility so that the data in Table 1 may also support Hypothesis (a).

[12] Thomas, D. S.: op. cit. pp. 307–308.

[13] Leybourne, Grace G.: Urban Adjustments of Migrants from the Southern Appalachian Plateaus, *Social Forces*, XVI, No. 4, Dec. 1937, pp. 238–247.

compared rural migrants with nonmigrants in Cincinnati.

A study by Kiser[14] is relevant to the problem stated in Hypothesis (c). He reports no significant differences between the fertility of Columbus, Syracuse, or Harlem wives born in "cities," "villages," or rural areas. The data by birthplace of husband *and* wife together yielded similar results. As Kiser points out, the main difficulties with these data are: (1) the small samples, (2) the use of birthplace rather than place reared, and (3) the narrow range between the "city," "village," and rural classifications.[15]

The data in the last three columns of Table 1 are inconsistent with the findings reported by Kiser. However, the two studies are not readily comparable. From Table 1 it is evident that there are differentials among urban migrant women which resemble the differentials found between their communities of origin. It seems likely that the discrepancy between Table 1

Table 1. Fertility ratios[1] by migration status of woman; 1935 to 1940; native-white women 15–49 years old, married once and husband present and living in urban areas in 1940, by age of woman in 1940.[2]

Age of Woman in 1940	Nonmigrant		Migrant		
	Same House 1935 and 1940	Different House Same City or County	Inter-Urban	Rural Nonfarm to Urban	Rural Farm to Urban
	(1)	(2)	(3)	(4)	(5)
15–19	379	455	354	338	388
20–24	614	685	542	596	671
25–29	645	671	577	628	694
30–34	455	502	496	514	549
35–39	249	306	275	299	434
40–44	109	137	129	135	237
45–49	25	34	20	43	78

[1] The fertility ratios represent the number of children under 5 years old per 1,000 women of the given age group.

[2] Source: U. S. Department of Commerce: Bureau of the Census: Population: Differential Fertility, 1940 and 1910; women by number of children under 5 years old. Washington, Government Printing Office, 1945, p. 6.

[14] Kiser, C. V.: Birth Rates Among Rural Migrants in Cities. Milbank Memorial Fund *Quarterly*, xvi, No. 4, Oct. 1938, pp. 369–381.

[15] The lower class limit of the "city" classification was 10,000.

and Kiser's findings are explicable in terms of the relative remoteness in time of the residential classifications.

Although the data from the 1940 Census are probably the best that have been available up to the present time, they leave unanswered certain questions. For example, we do not know how much mobility is associated with the various migrant classifications since only two points in the woman's migration history are known, i.e. residence in 1935 and 1940. We do not know what differences in fertility might appear if classification were based on the husband's migration status or on the joint migration status of husband and wife. On these matters the Indianapolis data throw some light.[16]

The Data

A detailed description of the methods of collecting data and the nature of the data has been given in previous reports in this series.[17] All tabulations in this study are for "relatively fecund" couples. The "inflated" sample of 1,444 couples is used as the basis for all tabulations but the application of chi square takes

[16] The chief superiority of the Census data is the possibility of making controlled comparisons between the rates of migrants and nonmigrants, urban against urban; rural-nonfarm against rural-nonfarm; rural-farm against rural-farm, even though the degree of control achieved is not great. The difficulties in the way of setting up outside control groups in the present study are discussed in the next section.

[17] The following summary is repeated from an earlier study:

Briefly stated, short schedules were filled out for 41,498 native-white couples with wife under 45 in a Household Survey of Indianapolis. The Intensive Study was restricted to 2,589 native-white Protestant couples whose marriages were contracted during 1927–1929, and were unbroken at the time of the interview in 1941. Additional requirements for inclusion were: the wife was under 30 and the husband under 40 at marriage, neither had been previously married, the couple had resided in a large city most of the time since marriage, and both husband and wife had at least completed grammar school.

At the conclusion of the field work long schedules had been completed for 860 "relatively fecund" couples and briefer ones for 220 "relatively sterile" couples, a total of 1,080. The adjusted or "inflated" sample consists of 1,444 "relatively fecund" and 533 "relatively sterile" couples, a total of 1,977. Couples refusing to cooperate in the Study comprise about 11 per cent of those contacted. Despite their absence, the inflated sample is quite similar to the original universe of 2,589 eligible couples not only with respect to the distribution by number of live births but also with respect to such distributions as dwelling units by rental value and husbands and wives by age and educational attainment.

Kiser, C. V. and Whelpton, P. K.: Social and Psychological Factors Affecting Fertility, IX Fertility Planning and Fertility Rates by Socio-Economic Status, Milbank Memorial Fund *Quarterly*, April, 1949, XXVII, No. 2, p. 192. (Reprint p. 363.)

into account the fact that only 860 cases were independently drawn.[18]

The categories of fertility-planning status used in this study have also been described previously. In general, the detailed pregnancy and contraceptive histories, including data on outcome of pregnancies and attitudes toward each pregnancy, constitute the criteria for the classifications by planning status. The categories used, in descending degree of success in planning family size, are described below.

Number and Spacing of Pregnancies Planned. The 403 couples in this group exhibit the most complete planning of fertility in that they had no pregnancies that were not deliberately planned by stopping contraception in order to conceive. The group consists of two major subdivisions: (a) 121 couples practicing contraception regularly and continuously and having no pregnancy, and (b) 282 couples whose every pregnancy was deliberately planned by interrupting contraception in order to conceive.

Number Planned. This group of 205 couples consists mainly of those whose *last* pregnancy was deliberately planned by stopping contraception in order to conceive but who had one or more previous pregnancies under other circumstances. Because of this, the couples are regarded as having planned the number but not the spacing of their pregnancies.

For couples not classified as "number and spacing planned" or as "number planned" the previously mentioned criteria regarding attitudes of husband and wife to each pregnancy constitute the bases for classification.

Quasi-Planned. This group includes 454 couples who did not deliberately plan the last pregnancy in the manner described above but who either wanted the last pregnancy or wanted another pregnancy.

Excess Fertility. This group is composed of 382 couples classified as least successful in planning size of family because they neither wanted the last pregnancy nor another.[19]

[18] *See* Freedman, Ronald and Whelpton, P. K., No. x of this series, Fertility Planning and Fertility Rates by Religious Interest and Denomination. p. 423.
[19] Kiser and Whelpton, op. cit., pp. 210–211 (Reprint pp. 381–382).

Data relating to movement are available by number of moves for the ten years before marriage and the period since marriage. Only moves between communities are considered. Movement of husband and wife is tabulated separately for the premarital period.

The data on community size also refer to the ten year period before marriage and to the period since marriage. For the premarital period the data for husbands and wives are classified as follows:[20]

All or most of the time in cities of 300,000 and over
Most of the time in cities of 25,000 to 300,000
Most of the time in places under 25,000

In the tabulations which follow it has usually been necessary for want of cases to ignore a distinction between All and Most (of the time) which the coding makes possible for communities of 300,000 and over.[21] It is possible also to isolate those cases within each size group that had "some farm experience"[22] prior to marriage. A group "Under 25,000 with farm experience" is added whenever it is of sufficient size. In addition, region of birth (Northborn or Southborn) is given but because of the relatively few husbands or wives who were born in the South, detailed analysis is possible only for Northborn (or Northborn plus Southborn) cases. The following classification is used for the period after marriage:

Indianapolis only
Northern and Western, 100,000 and over (Except "Indianapolis only")
Northern and Western, some 2,500–100,000

[20] The distribution by community size in the premarital period was made by assigning individuals to the category in which they had lived "most" of the time. In case of a tie they were put in the smaller category.

[21] The importance of information thus lost can be estimated by subclassifying each size category by the premarital mobility of husband or wife. This has the advantage of testing the importance of the distinction within all size groups.

[22] An individual is classified as having "some farm experience" if he lived on a farm during any part of the ten year period or if his father (or substitute) was a "farmer," "farm laborer," etc.

Northern and Western, some Rural
Some Southern[23] Urban and/or Rural

Fertility is measured by number of children ever born. In addition, some idea of the pattern of family growth can be gained from a consideration of fertility by three four-year periods as follows:

Number of live births and adoptions by years after marriage.

Pattern	First 4 Years	Second 4 Years	Later Years
0	0	0	1 or More
1	0	1 or More	0 or Some
2	1	0	0
3	1	0	1 or More
4	1	1 or More	0
5	1	1 or More	1 or More
6	2 or More	0	0
7	2 or More	0	1 or More
8	2 or More	1 or More	0
9	2 or More	1 or More	1 or More

Of the various restrictions placed on the sample[24] the one requiring at least eight years of residence since marriage in a community of 25,000 or over requires special attention. The intention was to exclude couples whose birth rates and contraceptive practices represented an adjustment to village or rural environments, since the Indianapolis Study is primarily interested in the fertility of urban couples. The year-of-marriage restriction required eleven to fifteen years of married life which means that minima of from 53 to 72 per cent of the years since marriage were spent in cities of 25,000 and over. Because of this residence restriction and because the couples in this sample have been married between 11 and 15 years, the maximum rural or small town (under 25,000) residence since marriage is between 3 and 7 years. Some couples had no postmarital residence of this type at all and a considerable amount of urban

[23] Southern states are: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. All other states are Northern and Western.

[24] See footnote 17 above.

experience is characteristic of all categories. The likelihood is very great that this tends to reduce the size of the differences in fertility and fertility planning to be found when couples are classified by their postmarital residence.

The residence requirement undoubtedly has the effect also of reducing the size of the group having rural or village residence before marriage. The consequences of the restriction for premarital and postmarital mobility are less apparent.[25]

As suggested earlier in this paper, it is not possible to compare the fertility rates of migrant couples with those of nonmigrant couples in the communities of origin. Even if data for nonmigrants were available there would be the difficulty that

[25] The interrelationships beteween the independent variables in the present sample are important for an interpretation of the data. They may be summarized as follows:

(a) Although there is a tendency for the size of an individual's pre and postmarital communities to match up, about 36 per cent of the wives and 42 per cent of the husbands reporting some "rural" residence in Northern and Western areas since marriage were from communities of 300,000 and over before marriage. Only 3 per cent of the wives and 8 per cent of the husbands in this group had premarital residence in communities of 25,000 to 300,000. Thus only 50 per cent of the husbands and 61 per cent of the wives with some rural residence in the North and West since marriage were from small communities before marriage. As noted above, the bulk of the remainder of the "rural" classification has a background of experience with large urban communities (300,000 and over). However, our knowledge of migration during the period 1930 to 1940 suggests that many of this latter group originally came to communities of 300,000 and over from rural areas. The back flow to rural communities during the depression was not a movement of indigenous urbanites.

(b) Couples who lived in communities of 2,500 to 100,000 since marriage are relatively the most mobile group. Fifteen per cent of the couples in this category moved four or more times after marriage. The percentage of couples living in communities of 100,000 and over who moved four or more times was less than 3 per cent; of rural couples, 8 per cent.

(c) Husbands with the greatest relative mobility before marriage are those who before marriage lived in communities of 25,000 to 300,000; 22 per cent of this group moved 3 or more times before marriage as compared with 4 per cent and 8 per cent, respectively, for husbands from places of 300,000 and over and under 25,000. The wives with the greatest relative mobility before marriage were from communities under 25,000.

(d) There is a clear tendency for wives and husbands to have similar premarital residence histories. However, marriages between extremes are not uncommon. Thirty-seven per cent of the wives and 28 per cent of the husbands who were born in the North, who reported some premarital farm experience and lived most of the time in places under 25,000 (including rural areas), had married North-born partners whose chief premarital residence was in cities of 300,000 and over and who had no premarital farm experience. (Computed from Table 18.)

(e) For both husbands and wives there is a very slight tendency for mobility before marriage to be positively associated with mobility since marriage.

(f) Premarital mobility of husbands and wives is positively associated.

for the Indianapolis couples there tends to be an inverse relationship between the age of the wife at the time of enumeration and the number of children ever born. This results from the way in which age at marriage and duration of marriage were handled in the selection of the sample.[26] Thus, simple age standardized rates do not provide a basis for comparison, and age and duration specific rates are not available for, say, the population of Indiana by appropriate population size groups.

But in spite of the fact that these data are in some ways not ideal for an investigation of the general relationship between migration and fertility, they are superior in several other ways to data available to previous investigators. Their advantages are: the provision of an improved measure of mobility (number of moves instead of migrant-nonmigrant status); information regarding migration in the premarital and postmarital periods; the possibility of dealing with mobility and community size jointly; the use of a better set of class intervals for community size; the ability to deal with fertility planning both as a control and as a dependent variable.

Findings

Hypothesis (a)

Number of Moves and Fertility-Planning Status. The data in Table 2 do not indicate a relationship, either positive or negative, between frequency of movement before or after marriage and fertility planning. The relationships in columns 1 to 4 for each section of the table were tested by chi square and found not to be significant. This lack of relationship is surprising in view of the importance attributed to mobility in sociological theory. Several post factum interpretations suggest themselves.[27] First, the range of differences in mobility may not be

[26] Whelpton, P. K. and Kiser, C. V.: Social and Psychological Factors Affecting Fertility V. The Sampling Plan, Selection, and the Representativeness of Couples in the Inflated Sample. Milbank Memorial Fund *Quarterly*, XXIV, No. 1, Jan. 1946. pp. 88–90 (Reprint pp. 202–204).

[27] That the negative findings reported in this paper may be a function of small numbers should be kept in mind constantly.

great enough to bring out the expected behavioral differences. Second, differences in community size or in socio-economic status[28] may be related to mobility in such a way as to cancel the effects of mobility or fertility planning. Because of the small size of the "high" mobility groups further subclassification by community size or socio-economic status is not feasible. However, an examination of the relationship between mobility and community size reveals an inverse relationship which might obscure the relationships predicted for Table 2 if community size is related to fertility planning as stated in Hypothesis (b-2) (see below). The relationship[29] between mobility and

Table 2. Percentage distribution by fertility-planning status of couples with specified number of moves before and after marriage.

Number of Moves	Number of Couples	Per Cent Distribution by Fertility-Planning Status					
		Total	Number and Spacing Planned (1)	Number Planned (2)	Quasi-Planned (3)	Excess Fertility (4)	Planned Families[1] (5)
Since Marriage							
0	1,023	100	26.7	14.7	30.7	28.0	41.4
1	195	100	37.4	12.8	31.3	18.5	50.2
2	128	100	23.4	13.3	35.2	28.1	36.7
3	45	100	22.2	17.8	40.0	20.0	40.0
4 or More	52	100	30.8	9.6	30.8	28.8	40.3
10 Years Before Marriage (Husband)							
0	935	100	28.1	14.6	30.3	27.0	42.8
1	314	100	29.3	9.9	31.8	29.0	39.2
2	92	100	28.3	10.9	40.2	20.6	39.1
3 or More	96	100	22.9	22.9	33.3	20.8	45.8
10 Years Before Marriage (Wife)							
0	1,059	100	27.9	13.0	32.3	26.8	40.9
1	274	100	29.2	17.9	29.2	23.7	47.1
2	80	100	26.2	16.2	32.5	25.0	42.5
3 or More	31	100	22.6	16.1	19.4	41.9	38.7

[1] Includes number and spacing planned and number planned.

[28] For the relationship of fertility planning to socio-economic status see Kiser, C. V., and Whelpton, P. K.: Social and Psychological Factors Affecting Fertility IX. Fertility Planning and Fertility Rates by Socio-Economic Status. Milbank Memorial Fund *Quarterly*, XXVII, No. 2, April 1949, pp. 188–244 (Reprint pp. 359–415).

[29] The following coefficients of contingency were found:

(Continued on page 164)

socio-economic status[30] does not seem to be of sufficient magtude to cancel the relationship expected between mobility and fertility planning.

Number of Moves and Fertility. The relationship between mobility and fertility predicted by Hypothesis (a) is presented in Table 3.[31] The comparison of highest and lowest mobility couples indicates a difference in the relationship according to marital status. When couples are classified by their mobility since marriage the birth rate comparisons at the extremes are consistent with Hypothesis (a). This is not true of the couples classified by premarital mobility of the wife for here there is a suggestion of the reverse relationship. As shown above, these differences in fertility do not appear to be due to an outside

Table 3. Births per 100 couples by number of moves of the couple since marriage and by number of moves of the husband and wife before marriage.

Number of Moves	Mobility Status Considered					
	Couple Since Marriage		Husband Before Marriage		Wife Before Marriage	
	Birth Rate	Number of Couples	Birth Rate	Number of Couples	Birth Rate	Number of Couples
Total	203	1,444	203	1,444	203	1,444
0	204	1,023	201	935	200	1,059
1	191	195	212	314	195	274
2	219	128	193	92	256	80
3	218	45	205*	96*	239*	31*
4 or More	185	52				
Unknown	—	1		7		0

* Three or more moves.

Between socio-economic status and moves since marriage: C = .20
Between socio-economic status and moves before marriage (husbands): C = .14
Between socio-economic status and moves before marriage (wives): C = .18

[30] Socio-economic status was measured in this study by a summary index which included the following items: Average annual earnings of husband since marriage, shelter rent at time of interview, net worth, husband's longest occupation, purchase price of car, education of husband, education of wife, and a Chapin Scale rating. The index ratings were combined into five socio-economic groupings identified high to low as 0–19, 20–29, 30–39, 40–49, 50+. See IX of this series, Fertility Planning and Fertility Rates by Socio-Economic Status, Milbank Memorial Fund *Quarterly*, XXVII, No. 2, April 1949, pp. 214–216 (Reprint pp. 385–387).

[31] There is no subclassification by fertility planning status in Table 3 since this was not found to be related significantly to mobility.

Number of Moves of the Wife	Number of Moves of the Husband					
	0		1		2 or More	
	Birth Rate	Number of Couples	Birth Rate	Number of Couples	Birth Rate	Number of Couples
0	201	724	201	211	193	121
1	187	160	204	80	209	32
2 or More	241	51	335	23	214	35

Table 4. Births per 100 couples by jointly considered number of moves by husband and wife before marriage.

relationship between mobility and socio-economic status or between mobility and fertility planning. However, even the birth rates in column 1 which are consistent with Hypothesis (a) at the extremes suggest that the real relationship may be non-linear.[32]

The mobility classification for the postmarital period is a joint classification for husband and wife. Since decisions which effect reproductive behavior are joint products of husband and wife, it is desirable to inspect the relationship between premarital mobility of husband and wife and fertility. This may also aid in understanding the direct relationships in Table 3. In Table 4 such a classification with broader mobility categories is presented. The mean fertility for the entire group is 203. Appreciable departures from this average are found in the case of marriages between high mobility wives and low or medium mobility husbands. However, because of the small number of couples involved, the reliability of such a finding is problem-

[32] One reason that sharper differences in fertility between high and low mobility couples may not appear is the fact that some couples classified as non-movers before and after marriage may actually have moved at marriage. This is suggested by the fact that the group of non-movers is apparently too large. Couples who move neither before nor after marriage presumably would be couples who have always lived in Indianapolis, yet this group is larger than the group that has lived in Indianapolis since marriage and in communities of 300,000 and over before marriage. This latter group contains: (a) couples who have lived in Indianapolis before and after marriage plus (b) couples who have lived in Indianapolis since marriage but in other communities over 300,000 before. Therefore couples classified as non-movers before and after marriage cannot be taken as equivalent to the group that lived solely in Indianapolis before and after marriage. From a review of the coding instructions it appears likely that as many as 163 couples may have moved at marriage but were recorded as non-movers.

atic. But that future research on mobility and fertility should investigate possible differences between homogamous and heterogamous marriages is clearly indicated by Table 4.

Since Hypothesis (a) received some support in connection with postmarital mobility it might be asked whether that relationship appears more sharply when couples are classified by both premarital and postmarital mobility. When couples are classified by the premarital mobility of the wife in Table 5, the combination associated with highest fertility is no mobility since marriage—high before. Medium mobility in both periods is associated with highest fertility when classification is on the basis of the husband's premarital mobility. This combination is related to high fertility also when couples are classified by the wife's mobility. In neither case is maximum mobility before and after marriage associated with lowest fertility. This constitutes a denial of Hypothesis (a). However, the birth rate (193) for couples in which the husband was highly mobile both before and after marriage is lower than the rate (211)[33] for couples who moved two or more times after marriage irrespective of extent of premarital mobility. But when couples

Table 5. Births per 100 couples by mobility since marriage and mobility before marriage.

Number of Moves Before Marriage	Number of Moves Since Marriage					
	0		1		2 or More	
	Birth Rate	Number of Couples	Birth Rate	Number of Couples	Birth Rate	Number of Couples
Wife						
0	201	751	176	156	221	151
1	195	200	246	26	167	48
2 or More	256	72	*	13	231	26
Husband						
0	202	690	181	118	211	126
1	202	214	244	45	222	55
2 or More	214	115	156	32	193	41

* Rate not computed.

[33] Computed from Table 3.

Pattern of Family Growth				Number of Moves Since Marriage				
Pattern Number	Number of Births Occurring Within Successive Four-Year Periods of Married Life			0	1	2	3	4 or More
	First Period	Second Period	Third Period					
0	0	0	1 or More	5.6	8.2	4.7	0.0	3.8
1	0	1 or More	0 or Some	15.9	12.8	14.1	17.8	11.5
2	1	0	0	13.6	9.7	5.5	22.2	17.3
3	1	0	1 or More	8.1	12.8	13.3	6.7	9.6
4	1	1 or More	0	16.7	9.2	15.6	24.4	17.3
5	1	1 or More	1 or More	6.7	9.7	10.2	0.0	5.8
6	2 or More	0	0	9.4	11.8	7.0	0.0	3.8
7	2 or More	0	1 or More	3.8	2.1	7.8	0.0	1.9
8	2 or More	1 or More	0	5.8	4.6	6.2	24.4	11.5
9	2 or More	1 or More	1 or More	5.9	5.6	5.5	4.4	1.9
X	No Live Births			8.5	13.3	10.2	0.0	15.4
	Total (Per Cent)			100.0	99.8	100.1	99.9	99.8
	Number of Couples			1,023	195	128	45	52

Table 6. Pattern of family growth by mobility since marriage.

are classified by premarital mobility of the wife, the concurrence of high mobility in both periods is actually associated with higher fertility (231) than when the rates by postmarital mobility are taken alone. Thus Table 5 even though it fails to confirm Hypothesis (a) in a straightforward manner, does indicate the possible importance of sex differentials within the relationship. So far as the present data are concerned, Hypothesis (a) is borne out moderately in connection with the husband's mobility. In the wife's case a reversal of Hypothesis (a) is suggested.

Even though family size and mobility since marriage appear to be related only moderately, it might be asked whether high and low mobility couples differ in their patterns of family growth. Data pertaining to this question are presented in Table 6, which shows the percentage of each mobility group by various growth patterns.[34] A direct interpretation of Table

[34] Note that childless couples are excluded from Table 6. This results in a disproportionate reduction throughout the table in the number of couples who plan both number and spacing. The complex interaction between patterns of growth and fertility planning which might be expected is unfortunately not dealt with in Table 6.

6 is made difficult by the fact that family size is not controlled. Thus the relatively greater occurrence of non-movers than of high mobility couples in pattern 9 may be a function of the larger families of the former group. This difficulty can be overcome to some extent by comparing pairs of patterns—3 and 4, 7 and 8—in which size of family may be fairly similar. Another difficulty is that we do not know in which period since marriage the migrations occurred. On the basis of general knowledge we might expect a tendency for movement to be concentrated in the first four years after marriage. The way in which this general tendency may have been modified by the conditions affecting this group of migrants in the years 1930 to 1934 is difficult to estimate. It is nevertheless of interest to look for differences in family growth patterns between high and low mobility couples.

Differences between non-movers and high mobility couples with respect to patterns 3 and 4 are negligible. A comparison of patterns 7 and 8 shows a greater tendency for high than for low mobility couples to have their children during the first eight years (first and second periods) after marriage. For high mobility couples the ratio of pattern 8 to pattern 7 is about 6 to 1; for low mobility couples about 1½ to 1. Because the numbers involved are small it is desirable to try a somewhat different procedure which permits a grouping of patterns. Assuming that there are differences in mobility during the first four years after marriage between the high and low mobility groups, we can look for differences in fertility within this period. Thus it is seen that the differences in the relative numbers of high and low mobility couples having 0, 1, or 2 or more children in the first four years after marriage are not great.[35]

[35] The following figures are taken from Table 6.

Number of Births in 1st 4 Yrs After Marriage	0 Moves Per Cent	4 or More Moves Per Cent
0	21.5	15.3
1	45.1	50.0
2 or more	24.9	19.1

But it is interesting to note that even though low mobility couples ultimately have larger families, proportionately more of them are childless during this first period. In other words, there is no apparent tendency for mobile couples to be those which avoid reproduction altogether during this period. High mobility couples have proportionately more first births but proportionately fewer births of higher order during this period. Thus Table 6 suggests that the functional relationship expressed in Hypothesis (a) may be too simple to fit the facts. Table 6 reveals a greater tendency for mobile than nonmobile couples to concentrate child bearing in the early years of married life. This is more clearly brought out in Table 7 which gives the percentages of mobile[36] and nonmobile couples who have no births in each period.

Table 7. Per cent of high and low mobility couples having no birth in specified period since marriage.

Four-Year Period Since Marriage	Per Cent Childless	
	0 Moves	3 or More Moves
First Period	21.5	16.4
Second Period	40.5	32.9
Third Period	45.5	59.8
Number of Couples	1,023	97

Summary, Hypothesis (a)

Neither mobility before nor after marriage is found to be related to fertility planning although the predicted relationship may have been masked by relationships between mobility and size of community.

The relationship of fertility and mobility since marriage is consistent with the hypothesis. This is not true of mobility before marriage, especially when couples are classified according to the wife's mobility. The evidence suggests that heterogamous marriages, involving high premarital mobility for the wife and low premarital mobility for the husband are associated with *above average* fertility. High mobility for the husband both before and after marriage is associated with somewhat reduced fertility; but for the wife high mobility in both periods is associated with above average fertility.

[36] The two most mobile groups are combined in Table 7.

Some differences are found in pattern of family growth between high and low mobility couples. High mobility couples do not appear to reduce their fertility rates in the early periods of married life as much as do low mobility couples. To the extent that these early years are the years of greatest mobility this finding is inconsistent with Hypothesis (a). However, pattern of family growth does not appear to be a simple linear function of mobility.

The fact that Hypothesis (a) receives only qualified substantiation from this analysis may be due in part to the rather high degree of homogeneity of the sample, one aspect of which is a limited range of mobility. However, the importance given to mobility in sociological theory would lead one to expect it to produce differences in behavior even among a fairly homogeneous group. Perhaps the most important implication of this analysis of Hypothesis (a) is the question it raises concerning the sufficiency of the concept of mobility in sociological generalizations.

Hypothesis (b-1)

Column 1 of Table 8 shows that for all planning groups the birth rates of urban,[37] migrant couples to Indianapolis are lower than those of Indianapolis nonmigrants. Rural inmigrants, on the other hand, exceed Indianapolis couples in fertility. Hypothesis (b-1) is stated in terms of the size of "planned families," i.e. families planned as to number and spacing as well as number. Column 6 shows slight differences in size of planned families that are consistent with the hypothesis.[38] Rural couples who do not plan the size of their families have much higher rates than Indianapolis nonmigrants (Column 5) but the extent to which this differential is reduced through planning is not known. Column 4 indicates, as does column 5, that rural migrants tolerate or rationalize larger families than do the nonmigrants. The mean family size defined as excessive by some

[37] The two classifications Northern and Western 100,000 and over, and Northern and Western 2,500 to 100,000 together will sometimes be called "urban."

[38] The number of rural families is too small for analysis.

nonmigrants is 44 per cent greater than the family size "accepted" by other nonmigrants whereas the comparable figure for rural migrants is 56 per cent. If it is assumed that this same relative difference persists between Quasi-planned and Planned Families, an "estimated" rate of rural Planned Families may be computed. This rate is shown in column 6. The rates of migrant and nonmigrant couples in column 6 are consistent with Hypothesis (b-1) but perhaps the more important observation is the relative convergence of rates among Planned Families in contrast to the spread in columns 4 and 5.

An investigation of Hypothesis (b-1) with respect to resi-

Table 8. Births per 100 couples by fertility-planning status and by residence since marriage.

Community Size and Location	Fertility-Planning Status					
	All Planning Groups (1)	Number and Spacing Planned (2)	Number Planned (3)	Quasi-Planned (4)	Excess Fertility (5)	Planned Families[a] (6)
	Births per 100 couples					
Indianapolis Only	204	110	229	199	286	152
Northern and Western, 100,000 and Over	184	104	•	203	•	140
Northern and Western, Some 2,500–100,000	185	109	200	194	287	138
Northern and Western, Some Rural	279	•	•	242	377	169[b]
Northern Urban and Rural	203	•	•	•	•	140
Some Southern Urban and Rural	192	•	•	•	•	126
	Number of couples					
Indianapolis Only	1,023	273	150	314	286	423
Northern and Western 100,000 and Over	110	46	17	32	15	63
Northern and Western, Some 2,500–100,000	179	55	26	67	31	81
Northern and Western, Some Rural	72	13	4	24	31	17
Northern Urban and Rural	361	114	47	123	77	161
Some Southern Urban and Rural	59	15	8	17	19	23

• Rate not computed.
[a] Includes number and spacing planned and number planned.
[b] Rate estimated. Procedure described in text.

dence before marriage was not undertaken for the following reasons: (a) the analysis would not be especially meaningful if postmarital residence were not controlled, (b) the only postmarital residential classification of sufficient size to withstand subclassification is "Indianapolis Only," and (c) this would require the isolation of couples who lived in Indianapolis before and after marriage as the nonmigrant group. However, (d) as discussed in footnote 32, this group cannot be satisfactorily identified.

Although a migrant-nonmigrant comparison by community size for the premarital period cannot be made, we can still examine the relationship between postmarital migrant and nonmigrant couples subclassified by premarital residence. The data for all planning groups are presented in Table 9; subclassification by fertility planning status is not feasible. Nonmi-

Table 9. Births per 100 couples by residence before and after marriage.

Community Size Since Marriage	Community Size Before Marriage							
	Husband				Wife			
	300,000 or Over	25,000–300,000	Under 25,000[1]	Under 25,000 With Farm Experience	300,000 or Over	25,000–300,000	Under 25,000[1]	Under 25,000 With Farm Experience
	Births per 100 couples							
Indianapolis Only	210	226	182	200	209	204	193	198
Northern and Western, 100,000 and Over	160	194	•	•	128	190	227	•
Northern and Western, Some 2,500-100,000	184	175	195	157	208	179	170	190
Northern and Western, Some Rural	•	•	•	238	315	•	268	•
	Number of couples							
Indianapolis Only	592	27	98	121	586	28	122	132
Northern and Western, 100,000 and Over	35	32	19	15	42	20	22	14
Northern and Western, Some 2,500-100,000	44	44	49	21	39	39	56	29
Northern and Western, Some Rural	19	3	15	21	20	2	22	19

[1] Without farm experience.
• Rate not computed.

grants since marriage classified by husband's premarital residence generally have higher fertility rates than urban migrants. Couples with some rural residence since marriage and in which the husband was rural before marriage have higher rates than nonmigrant couples in which the husband was rural before marriage. When couples are classified according to the wife's premarital residence, the nonmigrant couples also tend to have higher rates than urban migrants and lower rates than rural migrants.

As in the case of mobility since marriage, residence histories since marriage are compared with respect to pattern of family growth (Table 10). Nonmigrant couples and migrant couples from cities of 100,000 or over show a greater preference for pattern 4 over pattern 3 than do migrant couples from smaller places. Pattern 4 represents relatively greater concentration of fertility in the first eight years after marriage. Migrant couples from cities of 100,000 or over also display a relatively greater preference for pattern 8 over pattern 7 than do other migrant or nonmigrant couples. This again represents greater

Table 10. Pattern of family growth by residence since marriage.

Pattern Number	Pattern of Family Growth: Number of Births Occurring Within Successive Four-Year Periods of Married Life			Indianapolis Only	Northern & Western 100,000+	Northern & Western Some 2,500–100,000	Northern & Western Some Rural	Some South Urban and Rural
	First Period	Second Period	Third Period	(1)	(2)	(3)	(4)	(5)
0	0	0	1 or More	5.6	10.0	4.5	0.0	8.5
1	0	1 or More	0 or Some	15.9	12.7	16.8	15.3	3.4
2	1	0	0	13.6	9.1	12.3	5.6	15.2
3	1	0	1 or More	8.1	7.3	16.8	9.7	8.5
4	1	1 or More	0	16.7	24.5	14.5	2.8	5.1
5	1	1 or More	1 or More	6.7	6.4	5.6	15.3	11.9
6	2 or More	0	0	9.4	7.3	8.4	8.3	8.5
7	2 or More	0	1 or More	3.8	.9	3.9	6.9	3.4
8	2 or More	1 or More	0	5.8	5.4	5.6	11.1	16.9
9	2 or More	1 or More	1 or More	5.9	3.6	2.8	15.3	1.7
X	No Live Births			8.5	12.7	8.9	9.7	16.9
	Total (Per Cent)			100.0	99.9	100.1	100.0	100.0
	Number of Couples			1,023	110	179	72	59

concentration of reproduction in early years of married life. Apart from this tendency for residents of larger cities to spread their fertility over a shorter time span, other differences in Table 10 appear to be a function of family size.

Hypothesis (b-2)

The distribution of couples in Table 11 gives marked support to the hypothesis. Urban migrants to Indianapolis excel Indianapolis couples in their effectiveness in planning fertility. This is especially true of urban migrant couples who have lived in places of 100,000 and over since marriage. These couples plan both number and spacing of their children over one and a half times as frequently as nonmigrant couples. On the other hand, the relative frequency of nonmigrants in the excess fertility group is twice that of urban nonmigrants. The reverse tendency with respect to planning effectiveness is displayed by rural migrants. Column 5 shows the same pattern but with modulated differences. Because of the small number of cases further subclassification in connection with this hypothesis is not attempted.

Summary Hypotheses (b-1) and (b-2)

Couples living in Indianapolis continuously since marriage

Table 11. Extent of planning fertility by residence since marriage.

Community, Size, and Location	Number of Couples	Per Cent Distribution by Fertility-Planning Status*					
		Total	Number and Spacing Planned (1)	Number Planned (2)	Quasi-Planned (3)	Excess Fertility (4)	Planned Families (5)
Indianapolis Only	1,023	100	26.7	14.7	30.7	28.3	41.3
Northern and Western, 100,000 and Over	110	100	41.8	15.4	29.1	13.6	57.3
Northern and Western, Some 2,500—100,000	179	100	30.7	14.5	37.4	17.3	45.2
Northern and Western, Some Rural	72	100	18.1	5.6	33.3	43.0	23.6
Northern Urban and Rural	361	100	31.6	13.0	34.1	21.3	44.6
Southern Urban and Rural	59	100	25.4	13.6	28.8	32.2	39.0

* For numerical distribution, *see* Table 8.

have larger planned families and are somewhat less effective planners than urban migrants to Indianapolis. The birth rate for planned families with some rural residence after marriage had to be estimated and in so far as the estimate has any value it indicates that rural couples since marriage have larger planned families than Indianapolis nonmigrants. These rural couples are less effective with respect to fertility planning than Indianapolis couples.

Wherever comparisons can be made, similar differences in fertility between nonmigrants and the urban and rural migrants are observable when their premarital residence history is taken into account.

Some differences in patterns of family growth are apparent. Urban migrants from large places tend to complete their reproductive life earlier than other groups. This cannot be explained simply by their greater planning effectiveness which enables them to avoid pregnancy in the later periods of married life, because the pregnancy avoidance of other groups in the earlier periods of married life must also be explained. It is possible that the fertility planning status classification, which relies heavily on the attitude toward the last pregnancy for its definition of ineffectiveness, may not be realistic. This problem needs further exploration.

Hypothesis (b-1) cannot be tested adequately within socio-economic groups because of the small number of medium and high status couples with rural residence after marriage. Within the two lowest socio-economic categories, however, the data are consistent with the hypothesis. Among couples of medium and high status the birth rates of nonmigrants and urban migrants are fairly similar. Medium status urban migrants have a rate of childlessness that is twice that of nonmigrants of like status. This is consistent with the hypothesis.

Hypothesis (c)

The findings with respect to Hypothesis (c) have already been indirectly presented. Obviously, if urban migrants have

Community, Size, and Location	Per Cent Distribution by Fertility-Planning Status				
	Total	Number and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
	HIGH STATUS				
North and West Cities:					
100,000 and Over	100	44.1	13.6	37.3	5.1
2,500—100,000	100	39.5	15.1	26.8	18.6
Some Rural	—	—	—	—	—
	MEDIUM STATUS				
North and West Cities:					
100,000 and Over	100	53.8	26.9	15.4	3.8
2,500—100,000	100	19.0	11.9	54.8	14.3
Some Rural	—	—	—	—	—
	LOW STATUS				
North and West Cities:					
100,000 and Over	100	24.0	8.0	24.0	44.0
2,500—100,000	100	25.5	15.7	41.2	17.6
Some Rural	100	5.8	9.5	21.0	66.7

Table 12. Extent of planning fertility by residence since marriage and by socio-economic status.

lower birth rates and are relatively more effective in fertility planning than nonmigrants, and if the opposite is true of rural migrants, then the differences between urban and rural migrants are given. Nevertheless for purposes of presentation it is considered advantageous to isolate the question of fertility differentials among migrants. For convenience the second part of Hypothesis (c) may be examined first. The middle section of Table 11 shows for Northern and Western couples a clear and fairly regular positive relationship between size of community and fertility planning.[39] Also observable in Table 11 is a slight tendency for Northern migrant couples to excel Southern migrant couples in effective contraception. How-

[39] Chi square for this portion of Table 10 is significant beyond the .01 level; coefficient of contingency = .37.

ever, these differences are not great and cannot be analyzed further without knowledge of the internal, rural-urban, composition of the two regional categories.

Table 12 tests the relationship between residence since marriage and fertility planning within socio-economic status categories. In general, the relationship stands up within the three socio-economic groups.[40] This is most apparent if the extreme planning status groups within each socio-economic level are considered. Differences consistent with Hypothesis (c) appear in comparisons between places of 100,000 and over and places of 2,500 to 100,000 for high and medium socio-economic status

Table 13. Extent of planning fertility by residence of wife before marriage.

Community, Size, and Location	Number of Couples	Per Cent Distribution by Fertility-Planning Status					
		Total	Number and Spacing Planned (1)	Number Planned (2)	Quasi-Planned (3)	Excess Fertility (4)	Planned Families (5)
Northborn and Southborn							
300,000 and Over[1]	756	100	28.1	13.6	30.6	27.8	41.7
25,000–300,000[1]	107	100	33.3	14.7	23.3	28.7	48.0
Under 25,000[1]	258	100	26.2	15.1	35.0	23.7	41.3
Under 25,000 with Farm Experience	242	100	23.0	15.4	32.2	29.3	38.4
Northborn[1]							
300,000 and Over	704	100	28.4	13.3	29.9	28.3	41.8
25,000–300,000	92	100	37.0	13.9	25.0	24.1	50.9
Under 25,000	223	100	26.5	14.1	35.2	24.2	40.6
Northborn (With Farm Experience)							
300,000 and Over	48	100	47.9	6.2	22.9	22.9	54.1
25,000–300,000	0	—	—	—	—	—	—
Under 25,000	203	100	22.2	16.2	33.0	28.6	38.4
Southborn							
300,000 and Over[1]	52	100	27.6	15.5	39.7	17.2	43.1
25,000–300,000[1]	15	100	14.3	19.0	14.3	52.4	33.3
Under 25,000[1]	35	100	23.9	21.1	33.8	21.1	45.0
Under 25,000 with Farm Experience	39	100	27.8	11.1	27.8	33.3	38.9

[1] Without farm experience.

[40] High = 0–19, 20–29; Medium = 30–39; Low = 40–49, 50 and over. For a description of this socio-economic index see footnote 30 above.

groups. For low status couples the hypothesis is confirmed only in comparisons between rural places and cities of 100,000 and over. Chi square is significant only for the differences within the medium status group.[41]

Tables 13 and 14 show the relationship between fertility planning and residence before marriage. Support for Hypothesis (c) is found among Northborn wives with farm experience and among Southborn husbands. Otherwise the data in these tables show no significant relationhips. But even these findings must be regarded as merely suggestive because of the small number of couples upon which they are based. Perhaps the major conclusion one might reach from an examination of

Table 14. Extent of planning fertility by residence of husband before marriage.

Community, Size, and Location	Number of Couples	Per Cent Distribution by Fertility-Planning Status					
		Total	Number and Spacing Planned (1)	Number Planned (2)	Quasi-Planned (3)	Excess Fertility (4)	Planned Families (5)
Northborn and Southborn							
300,000 and Over[1]	759	100	27.0	16.4	26.9	29.7	43.4
25,000–300,000[1]	119	100	39.6	9.7	34.7	16.0	49.3
Under 25,000[1]	212	100	26.3	10.9	39.3	23.5	37.2
Under 25,000 With Farm Experience	218	100	24.8	9.2	42.7	23.4	34.0
Northborn[1]							
300,000 and Over	698	100	25.8	15.6	28.3	30.3	41.4
25,000–300,000	111	100	39.2	10.8	33.8	16.2	50.0
Under 25,000	188	100	26.8	10.8	40.9	21.4	37.6
Northborn (With Farm Experience)							
300,000 and Over	82	100	22.0	13.4	31.7	32.9	35.4
25,000–300,000	19	*	—	—	—	—	—
Under 25,000	181	100	26.0	8.3	45.3	20.4	34.3
Southborn							
300,000 and Over[1]	61	100	39.0	23.2	13.4	24.4	62.2
25,000–300,000[1]	8	*	—	—	—	—	—
Under 25,000[1]	24	100	23.0	11.5	29.5	36.1	34.5
Under 25,000 With Farm Experience	37	100	19.0	13.5	29.7	37.8	32.5

[1] Without farm experience.
* Percentage not computed.

[41] Chi square significant beyond the .01 level; coefficient of contingency = .69.

Tables 11, 13, and 14 is that with respect to fertility planning, the postmarital environment appears to be of greater importance than the premarital environment. It may be that the findings for Northborn wives with farm experience and Southborn husbands are interpretable in terms of the postmarital environment they represent.

Data bearing on the first part of Hypothesis (c) are presented in Table 8. There is virtually no difference between the birth rates of migrant couples, All Planning Groups, who lived in cities of 100,000 and over and those who lived in cities of 2,500 to 100,000 after marriage. However, there is a sharp birth rate differential between these urban migrants and those having some rural experience after marriage. The relationship cannot be tested among Planned Families because of the small number with rural experience.

A comparison of the rates for Northern and Southern couples indicates that regional differences are not great. The rates of Northern couples are slightly higher regardless of planning status. The relative contributions of urban and rural components to this result are not known.

Table 15 indicates that the differences observed in Table 8 are maintained within mobility groups. Parenthetically, it may be noted that Table 15 contains what is perhaps the most convincing negative evidence with respect to Hypothesis (a). Northern and Western couples from communities of 2,500 to 100,000 who have moved two or more times have higher fertility rates than couples from these places who have moved

Table 15. Births per 100 couples by number of moves since marriage and by residence since marriage.

Number of Moves	North and West 100,000 and Over		North and West Some 2,500—100,000		North and West Some Rural	
	Birth Rate	Number of Couples	Birth Rate	Number of Couples	Birth Rate	Number of Couples
1	184	69	154	65	274	35
2 or More	183	41	203	114	284	37

only once. If Hypothesis (a) were to hold anywhere it should be within this group since, as already pointed out, this population size group has the greatest relative representation in the high mobility categories.

Birth rates among migrants classified by premarital residence and place of birth are shown in Table 16.[42] If either wife

Table 16. Births per 100 couples by residence of the husband and wife before marriage.

Community, Size and Location	Birth Rate		Number of Couples	
	Husband	Wife	Husband	Wife
Northborn and Southborn [1]				
300,000 and Over	205	204	759	756
25,000—300,000	186	200	119	107
Under 25,000	201	201	212	258
Northborn and Southborn (With Farm Experience)				
300,000 and Over	200	189	103	62
25,000—300,000	180	—	25	19
Under 25,000	209	211	218	242
Northborn [1]				
300,000 and Over	206	205	698	704
25,000—300,000	184	184	111	92
Under 25,000	200	199	188	223
Northborn (With Farm Experience)				
300,000 and Over	207	167	82	48
25,000—300,000	—	—	19	0
Under 25,000	199	208	181	203
Southborn [1]				
300,000 and Over	197	171	61	52
25,000—300,000	—	—	8	15
Under 25,000	212	211	24	35
Southborn (With Farm Experience)				
300,000 and Over	171	—	21	14
25,000—300,000	—	—	—	19
Under 25,000	260	223	37	39

[1] Without farm experience.

[42] Since, in general, fertility differentials within planning status groups parallel those found for All Planning Groups, the data in Table 15 are not given by fertility planning status. Moreover, the number of Southborn couples and Northborn couples with farm experience, among whom subclassification by planning status seems most desirable, is not large enough to permit it.

or husband was born in the South or if the Northborn wife has had some farm experience, there is an inverse relationship between birth rates and community size before marriage. This seems to be the consequence both of below average rates among the most urban couples in these two groups and higher than average rates among the rural couples. That these rates are related to differences in contraceptive effectiveness is evident if one refers again to Tables 13 and 14. Beyond this however, it is not possible to go with the present data. Clearly here is an area needing further inquiry.

Also noteworthy in Table 16 is the fact that, in contrast to the wife, the fertility of Northborn husbands does not appear to be influenced by their contact with rural life. It is possible of course that under the rather broad definition being employed, the type of "farm experience" may differ between husbands and wives. The interpretation made of Table 16 should also take account of the possibility that in those cases where high fertility is associated with the classification "Under 25,000 with Farm Experience" it may not be farm experience *per se* which is important but the selection of smaller communities under 25,000 which results from the combination with farm experience.

Table 17. Births per 100 couples living in Indianapolis since marriage by residence before marriage and by socio-economic status.

Residence Before Marriage	Index of Socio-Economic Status				
	0–19 (High)	20–29	30–39	40–49	50 and Over (Low)
	Births per 100 couples				
Husband—Northborn and Southborn					
300,000 and Over	182	153	134	196	309
Under 25,000 and Rural	154	145	193	192	284
Wife—Northborn and Southborn					
300,000 and Over	178	164	190	196	303
Under 25,000 and Rural	162	131	170	187	307

In Table 17 the relationship of premarital residence to fertility has been examined within socio-economic groups for couples who have had a common residential history since marriage.[43] This table shows even more clearly than does Table 16 the absence of the inverse relationship when Northborn and Southborn couples are not distinguished.

Table 9 indicates that the expected inverse relationship of fertility with size of community of residence appears only within the group that lived since marriage in Northern and Western cities over 100,000. Couples that lived in large cities both before and after marriage have much lower rates than couples who lived in small communities before and after marriage. That this may be due primarily to the influence of the postmarital environment is suggested by an even greater differential between couples in cities of 100,000 and over and rural since marriage in which the wife was a resident of a city of 300,000 or over before marriage. This may be seen more

Table 18. Births per 100 northborn couples by residence of husband and wife before marriage.

Wife's Residence	Husband's Residence			
	300,000 and Over	25,000–300,000	Under 25,000[1]	Under 25,000 With Farm Experience
	Births per 100 couples			
300,000 and Over	206	152	181	221
25,000–300,000	182	179	*	*
Under 25,000[1]	217	*	203	176
Under 25,000 With Farm Experience	223	*	202	208
	Number of couples			
300,000 and Over	472	23	58	43
25,000–300,000	22	47	5	9
Under 25,000[1]	63	15	65	54
Under 25,000 With Farm Experience	61	12	42	48

[1] Without farm experience.
* Rate not computed.

[43] To secure comparisons within all socio-economic groups, Under 25,000 and Under 25,000 with Farm Experience have been combined.

Husband's Residence Compared with Wife's	Birth Rate	Number of Couples
Husband from Larger Community than Wife	211	215
Husband and Wife Same	204	632
Husband from Smaller Community than Wife	186	192

Table 19. Births per 100 northborn couples by comparative size of community of residence of husband and wife before marriage.

clearly if the birth rate (304) for the 44 couples who lived in small communities since marriage but in larger ones before is contrasted with the rate (234) for the 70 couples who lived in small communities before marriage but in larger ones since.[44]

It is interesting to observe in Table 18 that when Northborn couples are classified on the basis of both husband and wife's premarital residence there is no evidence in support of Hypothesis (c) for homogamous pairings. The birth rates of couples in which both partners lived in cities of 300,000 and over are virtually the same as those of couples where both partners are from communities of less than 25,000 and have some farm experience in addition. However, extreme heterogamy is associated with above average fertility.[45] Thus, it appears that differences in background of husband and wife may be as important as the absolute size of the communities from which they come. Also evident in Table 18 is the suggestion that the wife is a better carrier of rural and small community birth rate patterns than is the husband. This is brought out in Table 19 which recombines the data in Table 18.

Summary Hypothesis (c)

Among migrant couples a fairly sharp positive relationship is found between the size of community of residence after marriage and fertility planning. This relationship is maintained within socio-economic groups.

Fertility planning and size of community before marriage

[44] Computed from Table 8.
[45] The mean birth rate for the table is 202.

are not positively related except among Northborn wives with farm experience and among Southborn husbands. (Tables 13–14.) The existence of the relationship among Northborn wives with farm experience and among Southborn husbands seems to be due to the relatively high effectiveness of planning that results when these backgrounds are combined with residence before marriage in communities of 300,000 and over. It seems reasonable that these combinations represent a greater range of experience[46] than any of the others and if so, the association with enhanced fertility planning is consistent with the argument underlying the hypothesis. This argument, it will be recalled, stresses a positive relationship between degree of environmental difference or, subjectively stated, range of new experience and tendency to plan. Presumably narrower ranges of experience before marriage are not sufficient to influence subsequent fertility planning. The suggestion that the postmarital environment is more important than the premarital environment with respect to fertility planning is offered, although differences in the classifications make such a generalization hazardous.

An inverse relationship between family size and size of community is found for the period since marriage. Whether this relationship is found among planned families cannot be determined directly but it does appear when an estimated rate for rural couples is used.

Couples in which the husband or wife was born in the South show an inverse relationship between fertility and size of community before marriage. In the husband's case this seems to be due to the high fertility of Southborn husbands from places under 25,000 and having some farm experience. In the wife's case the relationship appears to result from low fertility among Southborn wives from places of 300,000 and over. Thus it may be that the social and psychological dynamics associated with being born (and perhaps reared) in the South are different for

[46] Or perhaps greater adversity.

males and females. Further analysis is prevented by the small number of Southborn cases. This applies also to testing the relationhip with respect to the size of planned families.

Northborn wives with farm experience also show an inverse relationship between fertility and size of community before marriage. The low birth rates of the wives in this group who are from communities of 300,000 and over seem to be responsible for the relationship. It will be recalled that over 50 per cent of this group planned the number of children they had. The comparable husbands have higher birth rates. This difference in response to a large urban environment might be due to substantive differences in the specification "farm experience" between males and females. Or it might represent a difference in postmarital experience of males and females. It does *not* appear to be attributable to the fact that females are superior "carriers" of rural behavior patterns.

When postmarital residence is controlled an inverse relationship between fertility and size of community before marriage appears only within the group that has lived in places of 100,000 and over since marriage. This relationship does not depend upon region of birth or upon having "farm experience." It is attributable both to low fertility among couples who have large city experience before and after marriage, and to relatively high fertility among couples who have small town or rural experience before marriage. The relationship is more pronounced for the wife. Like many of the findings reported in this paper, this one needs further investigation with a larger sample. Otherwise, the size of the community of residence before marriage seems to be less closely associated with fertility than size of the community since marriage. Couples who lived in large communities before marriage and in small ones afterward have higher birth rates than those who lived in large ones after and small ones before. However, this should be viewed with caution since "small" places are not necessarily defined the same way in the two periods.

Finally it appears that combinations of large and small com-

munity experience for husband and wife leads to greatest departures from average fertility. Extreme heterogamy in this respect is associated with highest fertility. In addition, the husband appears to be a less effective carrier of small community birth rates than the wife. This may have something to do with known sex differences in migration. The longer distances traveled by male migrants may entail greater uprooting than in the case of female migrants. This interpretation is consistent with the basic argument of the hypothesis but cannot be readily checked with the present data.

Conclusion

The data available from the Indianapolis study are not ideal for the investigation of the foregoing hypotheses. Small numbers make some of the findings unreliable. Yet the examination of the data has pointed up certain areas of critical inquiry and has indicated that the original hypotheses are sometimes oversimplified. Since the Indianapolis study was conceived as a pilot study by the Committee it is pertinent to conclude this paper with a list of problems to which special attention might be given in future studies. Therefore in addition to reexamining all of the relationships of this study with a larger and perhaps less homogeneous sample, the following queries are suggested for consideration:

1. What is the critical range for mobility with respect to fertility and fertility planning? The present study indicates that neither fertility nor fertility planning is closely associated with variations in mobility within the range considered.
2. What differences in group structure are there between marriages of high mobility wives and low mobility husbands that are associated with higher fertility than either homoganous situation (i.e. low mobility for wife and husband or high mobility for both wife and husband)?
3. Similarly, what differences in group structure are there between marriages that are homogamous and those that are heterogamous with respect to premarital residence?

4. What is relevant to fertility and fertility planning in the designation "Southborn"?

5. What is relevant to fertility and fertility planning in the designation "Northborn with farm experience"? What sex differences are there with respect to this background characteristic?

6. What would be the relationship of mobility or community size to fertility if couples were classified by postmarital experience and premarital experience of husband *and* wife?

Other and perhaps more fruitful queries may occur to the reader.

ANNOTATIONS

THE POPULATION OF INDIA AND PAKISTAN

With Kingsley Davis' The Population of India and Pakistan,[1] the Office of Population Research adds another item to its growing list of major contributions in the field of demographic analysis. A book on the population of the Indian subcontinent is indeed a timely addition to this list. Interest in the subject is keen these days and much of what is being published belongs to the half-baked, or pot-boiler, school. Davis brings to his task a sociological point of view, a good knowledge of the population field and a superior array of demographic skills. The meticulous citation of sources in footnotes and the lengthy bibliography attest to a tremendous amount of reading and searching of the literature on India. Whatever the faults of the work may be, they are not those of going off half-cocked.

The materials are presented under six major headings, each embracing several chapters. The first part, "The Overall Picture," gives a general review of the quality and availability of demographic data, sketches in the geographic and climatic setting, speculates on the history of population growth before 1871 (the year of the first census) and presents the evidence of accelerating growth as derived from the eight censuses made during the following 70 years.

The next three parts, "The Fight against Death," "Human Fertility in India," and "The Net Balance: Natural Increase," contain the real demographic meat of the book. In these chapters, Davis brings together the available census data and vital statistics, copes with their deficiencies and inconsistencies, and

[1] Davis, Kingsley: The Population of India and Pakistan. Princeton University Press, Princeton, New Jersey, 1951, viii + 263 pages, $7.50.

finally draws from them a logical and convincing account of mortality and fertility levels and trends in the region. He then makes a brief excursion into the hazardous field of population projection. His computations yield a minimum of 560 million and a maximum of 790 million for the year 2000, as compared with 389 million enumerated in 1941. Since he states all the proper reservations concerning his underlying assumptions and since his figures permit such a wide range of possibilities for the demographic future of India and Pakistan, these reviewers are in no position to quarrel with them.

Part v, "Migration: Its Direction and Extent," indicates that immigration and emigration have been relatively unimportant, numerically speaking, and that before partition, population movement within the subcontinent was, as in most predominantly rural cultures, of a somewhat minor character.

The final part, "Social Structure and Social Change," concerns itself with the growth and characteristics of cities, the rate and degree of urbanization; with literacy and its variations by sex, age, religion, and urban or rural residence; with considerations of language, caste, and religion; with the causes and effects of partition, including the probable characteristics and prospects of the two new countries. One is struck with the lagging pace of industrialization and urbanization in a region which apparently has a great industrial potential in terms of both natural and manpower resources. India's colonial status comes in for a good share of the blame for this state of affairs, though other factors are mentioned as well.

The last three chapters deal with the economic situation and come to grips with the problem of population and resources development as they relate to the crucial question of how to raise the level of living of the people and how to raise it quickly. Davis' position can be briefly stated as follows: (1) Industrialization with its attendant urbanization has been slow in India; (2) levels of living may have risen slightly in the past few decades but population increase has prevented significant gains; (3) the backing-up of population on agricultural holdings, operated for the most part under antiquated and wasteful forms of land tenure, has built up a surplus of many millions who are not needed for agricultural production but who cannot

at once be turned to industrial production; (4) with the handicaps of domination until recently by a foreign power, the dislocations resulting from partition, the persistence of cultural impediments associated with caste and religion, the dedication of much of the national budget to military uses, the absence of accumulated capital, and the necessity of turning economic energy toward supplying consumer goods for immediate use rather than toward building up heavy industry whose effects on consumption can be felt only in the future—with these handicaps, the outlook for speedy industrial development is dubious; (5) there is certainly no shortage of human resources on the Indian subcontinent—in fact, the plethora of people appears to be a hindrance rather than a help to rapid industrialization; (6) the population policy that seems most reasonable, in view of these considerations, is one directed toward a deliberately reduced rate of growth while the countries struggle with ways and means of building up their industrial potentials and increasing the efficiency of productivity of their agriculture. Davis also mentions planned emigration as a possible element of population policy but does not appear to feel that the two governments would take kindly to the idea, let alone that other governments would readily throw open their gates to Indian or Pakistani immigrants.

Of the two methods by which the rate of growth could be reduced, increased mortality and lowered fertility, the author naturally favours the latter but was, at the time of writing, pardonably doubtful as to whether such a policy would be adopted officially and of how effective it might turn out to be if adopted. Since then, the Government of India has given some signs of interest in studying the feasibility of encouraging the practice of family limitation through birth control. The possibility exists that we may be able, for the first time, to witness the effects of a national policy directed at curbing the rate of population increase.

From the point of view of demographic techniques, Davis' work is an interesting demonstration of the application of mechanical ingenuity, guided by judicious inference, to a mass of data that unquestionably has a tale to tell, but that required processing, manipulation, even juggling, before the story could

be rendered intelligible. Most of the manipulation is adequately described in the ten appendices presented at the end of the volume, but in a few cases only a brief verbal description is given in the text. Of particular value are the methodological notes on the development of estimates of birth and death rates for the period 1881 to 1948. By playing off the data from various sources against one another, a series of approximations (albeit involving a certain amount of circular reasoning) are made to yield a set of consistent and reasonable results. Davis' estimates may not be correct but we are willing to warrant they are the best ones that have yet been produced. Certainly they form a useful yardstick against which to appraise the validity of past and current recorded or "official" rates.

Another valuable addition to demographic paraphernalia is an Indian life table for the decade 1911–1921 and one for the decade 1931–1941. The first is important because it furnishes a measure of the terrific impact of the influenza epidemic of 1918–1919 upon the population of India. (Davis estimates the staggering total of about 20 million lives lost.) The 1931–1941 table, though applicable to only a part of prepartition India, gives us the first inkling of trends in age-specific mortality and expectation of life since 1931.

Except for one summary volume which consists mostly of data on the geographic distribution of the population, the Census of 1941 is available only in an incomplete set of provincial volumes. Davis has, at some pains, assembled the available materials and extracted a considerable amount of information which is useful though unhappily only partial. Apparently this is about as far as we shall get with 1941 census data, many of the records having been destroyed or lost during the war period.

It is unfortunate that the results of the 1951 censuses of India and Pakistan were not at hand during the preparation of this volume. Such profound alterations in the political and economic life of the area have occurred in the last decade that the current demographic situation is difficult to assess. It is to be hoped that Davis will publish a postscript of some sort when the new data appear. In passing, it is interesting to note that his estimate of the 1950 population of India (357 million) is

amazingly close to the official estimate (358 million) based on the 1951 census count.

Naturally, it was not possible for a book of this type to be completely exhaustive. The selection of subjects for investigation or emphasis is necessarily in part a matter of individual taste and judgment. One might have liked to see, for instance, a more searching analysis of the relation between health and fertility and of the curious persistence of high sex ratios that is repeatedly observed in the data for India as well as in those for many other countries in that part of the world. No doubt such explorations would meet with formidable obstacles and yield inconclusive results, but an attempt to understand the relationships and phenomena involved would be worth while. Some such study might perhaps have been more fruitful than the rather extended treatment of caste and religion which not only runs through the entire discussion as relevant to any real understanding of demographic characteristics, but is also given two whole chapters for a separate and somewhat repetitive exposition. Because caste and religion are rather closely interwoven in the culture of the region and because there is doubt, in some quarters at any rate, that their influence is currently so overwhelming as it may once have been, the repetition that occurs and the emphasis that emerges seem a trifle excessive.

THE POPULATION OF INDIA AND PAKISTAN is an easy book to read. Davis has a direct vigorous style, with occasional flashes of "non-objectivity" that add to one's enjoyment without seriously jeopardizing the scientific validity of his findings. It should not be too difficult for the non-technical reader to follow the development; if so, there is a summary at the end of each chapter and a liberal supply of maps, charts, and tables that transmit the content in compressed and palatable form.

Since the book was written at a crucial moment in Indian history, and perforce leaves us dangling at a point where future directions cannot be safely predicted, its chief value is in furnishing a sound and comprehensive background against which to observe and appraise future demographic and social developments in two new nations that constitute an important element in a restless East—indeed, in a nervous and changing world.

C. K. DILWALI AND HOPE T. ELDRIDGE

SOCIAL BEHAVIOR AND PERSONALITY[1]

IN HIS Foreword to this volume, Donald Young remarks upon the fact that W. I. Thomas was unconcerned with his personal role in the development of modern social science and did nothing whatever to assure for himself a niche in the Hall of Fame: he left behind no autobiography, no "collected works," no "General Theory." SOCIAL BEHAVIOR AND PERSONALITY is an effort to do for him what he neglected to do for himself. It is the outgrowth of an offer by Dorothy Swaine Thomas to turn over to the Social Science Research Council all the rights in the publications and manuscripts of W. I. Thomas. A Committee appointed by the Council is responsible for the present work, although the actual preparation of the manuscript was done by Edmund H. Volkhart.

The book opens with an introductory chapter in which Volkhart analyzes the central interests and theoretical concepts of Thomas, and which provides a sort of summary of the points that are subsequently documented by extensive quotations from Thomas' published and unpublished writings. With few exceptions (e.g., "The Four Wishes") the various materials are ordered in terms of current concepts and problems. Thus there are chapters on "The Behavior Pattern and the Situation," "Configurations of Personality," "Social Disorganization," and "Personality and Culture." Through such classification of the various things that Thomas had to say on a given matter, his writings are, in a sense, brought "up-to-date" without distorting them. By careful and copious footnote reference to subsequent writers, Volkhart repeatedly demonstrates how great—if not always recognized—their debt is to Thomas. A complete bibliography of Thomas' published works and an exceedingly brief and uninformative Biographical Note, complete the book.

Thomas began writing in *The American Journal of Sociology* in 1899, when that now-august journal was but four years old (and this reviewer not quite born); his last published article appeared in the same journal in 1939. In the forty years between sociology, and indeed the social sciences as a whole, grew

[1] SOCIAL BEHAVIOR AND PERSONALITY: CONTRIBUTIONS OF W. I. THOMAS TO THEORY AND SOCIAL RESEARCH. Edited and Annotated by Edmund H. Volkhart. New York: The Social Science Research Council, 1951. ix, 338 pp. $3.00.

up and came of age. It seems reasonably safe to say that no other single man contributed more to that growth than Thomas. Some, like Ross, made considerably more noise; some, like Park, secured more disciples. But none of his generation excelled Thomas in intellectual curiosity, originality, clarity of expression, and sheer staying power. Thomas' interests were wide. He wrote on many topics; e.g., fashion, race prejudice, and methodology. From the outset of his career, however, he evidenced two dominant concerns: the use of data from primitive societies for comparative purposes, and the role of the female in both primitive and modern society. To some extent THE POLISH PEASANT IN EUROPE AND AMERICA, for which he is perhaps most noted, was a digression. But whatever the problem, Thomas invariably approached it in a direct and forthright fashion. His interest was people, their behavior and the causes thereof, and to this study he brought both insight and a degree of sympathetic understanding equalled only by that of Cooley. As a result, his concerns and concepts are sociopsychological rather than sociological; he deals with individuals and classes of individuals rather than social processes and the forms of social organization. When, thus, he discusses social change it is not at that exceedingly high level of abstraction which is characterized by the social lag concept but, rather, at the lower—and at least to this reviewer more meaningful—level of those social and psychological factors that foster innovation and those which retard adoption of new devices and procedures.

The concept of the "four wishes" is perhaps the most widely known and most discussed of those advanced by Thomas. It runs through much that he wrote, and it is clear from the selections provided in this volume that Thomas himself considered the concept one of his major contributions. But it is also evident that, in his later years at least, the concept was a methodological tool; a means of ordering data, rather than an explanation for those data. To explain behavior he relies mainly on the situation concept or, as he termed it, the "definition of the situation." His last book, PRIMITIVE BEHAVIOR, is, in fact, a massive demonstration of the varied definitions that different peoples make of situations. It is probably this concept, which is now thoroughly incorporated in sociopsychological theory,

rather than that of the four wishes, for which Thomas will be longest remembered.

SOCIAL BEHAVIOR AND PERSONALITY is far more than a memorial volume. Volkhart's analysis of Thomas' concepts, the meaningful way in which the selections have been organized, the inclusion of previously unpublished materials, and the inherent value of the subject matter, combine to make this book a useful contribution to the literature of social psychology as well as an addition to the personal stature of W. I. Thomas.

RICHARD T. LAPIERE

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DEMOGRAPHY[1]

ACCORDING to the author, "This book has been written mainly to provide a connected account of the principles and methods employed in the study of population for actuarial students and for all who are concerned with population statistics" (v). His purposeful restriction of the book to methodology is evinced at the outset by the statement "Where demography impinges upon the social sciences, on economics and on politics, due reference is made to the fact, but the subject is not pursued out of its natural limits into these tempting byways" (vi).

The book contains fifteen chapters, an addendum concerning the Report of the Royal Commission on Population, and three annexes giving census data for England, Wales, and Scotland. Throughout the book, as one might expect, the author relies mainly upon British materials for his examples and exposition of technique. This feature may make the book somewhat less attractive than it otherwise might be to teachers of demography in other countries. Nevertheless, the book probably will be used fairly widely in classrooms in non-British countries simply because of its merits as an able, scholarly, concise, and lucid exposition of the principles and methods of demography.

Following an introductory discussion of the scope and historical aspects of demography, are chapters on census enumera-

[1] Cox, Peter R.: DEMOGRAPHY, London and New York, Cambridge University Press, 1950, 326 pp., 20 shillings ($4.00 in U. S.).

tion, vital registration, migration records, sample population surveys, the analysis of mortality data, methods of comparing mortality experiences, the statistical investigation of fertility, marriage, the measurement of disability, the growth of population in England and Wales, population projection, a survey of some projections of the British population, Scottish demographic data, and suggestions for further study and research.

Although the book includes two chapters on mortality data, it contains virtually nothing on the theory and construction of the life table. This omission was deliberate and is explained by the fact that the subject is being covered in two other books by other authors, scheduled for publication for the Institute of Actuaries and Faculty of Actuaries. Nevertheless, this omission seriously undercuts the possibility of using Cox's work as a self-sufficient textbook.

Another rather noticeable omission is that of discussion of the rate of natural increase. The crude death rate is introduced in the chapter on mortality and the crude birth rate is briefly discussed in the chapter on fertility. The inadequacy of each is discussed but there is no statement that the chief value of these two rates arises from the fact that the difference between them affords the rate of natural increase. In fact, the "uninitiated" might have difficulty in understanding the relation between these two rates. The crude birth rate is described by the conventional formula:

$$\frac{\text{Number of live births in year}}{\text{Total population.}}$$

Instead of giving a parallel formula for the crude death rate, however, the author risks leaving the student bewildered with the information that the crude death rate is represented by:

$$R_t^A = \frac{\sum {}^tP_x \cdot {}^tm_x}{\sum {}^tP_x}$$

The reviewer encountered a misinterpretation within one of the author's rare excursions into data for other countries. In the discussion of mortality by color in Tennessee the author states: "The non-whites could not properly be subdivided into Negroes, Mexicans, Red Indians, Chinese and so on, as is

strictly necessary, because the death certificate information is deficient in this respect . . ." (p. 85.) One more familiar with as whites since the Census of 1940, and (b) that virtually all the data would know (a) that Mexicans have been classified of the nonwhites in Tennessee are Negroes. The 1940 Census reported over one-half million Negroes but only 199 nonwhites other than Negroes in Tennessee.

Cox's statement that "Edmund Halley . . . was the first to attempt to construct a life table on correct principles, that is, by the use of both population and deaths" needs some qualification. Lacking actual population data, Halley found it necessary to assume a stationary population. Fundamentally, as Newsholme has stated, Halley's life table "was based on deaths alone, *not on a comparison of the deaths and living at each age. . . .*" (Italics Newsholme's.[2])

Although this book was published for the Institute of Actuaries and the Faculty of Actuaries, it is by no means simply a "manual" or "handbook." The author never forgets that his task is to discuss principles as well as methods. Throughout the book there are repeated statements about conditions affecting the quality of the data, the possibility of concealed factors affecting variations in mortality and fertility rates, and the like. "The quality which is, perhaps, the most needed for success in demography is a proper understanding of the difficulties involved in the interpretation of the statistical data and the dangers inherent in their use to provide estimates applicable to future years" (v).

Although the author laments the frequent tendency "to assume without justification that apparent observed 'trends' will continue in the future" (v), he nevertheless recognizes the value of population projections for purposes of administration and planning, and devotes a chapter to methods in population projection. He emphasizes, however, that in the whole field of

[2] Newsholme, Sir Arthur: THE ELEMENTS OF VITAL STATISTICS. New York, D. Appleton and Company, 1924, p. 232.

For similar appraisals, *see:*

Westergaard, Harold: CONTRIBUTIONS TO THE HISTORY OF STATISTICS. London, P. S. King & Son, Ltd., 1932, pp. 32–34.

Henderson, Robert: MORTALITY STATISTICS. New York, John Wiley & Sons, 1915, pp. 2–3.

demographic data there are "many traps into which the uninitiated may fall unless he is cautious and not over-anxious to obtain impressive results. To make available a proper and unbiased interpretation and to prevent wrong conclusions being drawn by others should be the chief aims of all demographers" (v).

CLYDE V. KISER

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PHARMACOPOEA INTERNATIONALIS[1]

THIS appearance of the first international pharmacopeia under the imprint of the World Health Organization achieves the unification of pharmacopeias. In contrast to it, national pharmacopeias have reflected differences in the standards, strengths, and nomenclature of drugs of the various countries. These differences have been a source, if not of inconvenience and actual danger, of retardation in the spread of pharmaceutical knowledge. Unification in this international pharmacopeia is, therefore, more to be expected than explained. It is a welcome, long-awaited volume and another triumph for the World Health Organization.

H. D. KRUSE, M.D.

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COMMUNITY PLANNING FOR HUMAN SERVICES[2]

WHAT is the "American way of life?" Although the term is widely used, no adequate definitive description of what it consists has been made. Whatever else it includes, the pervasiveness and great extent of social services of the far-flung communities of the United States and the interesting intertwining of voluntary and tax-supported social services would stand out conspicuously in any effort to express the meaning of

[1] World Health Organization: PHARMACOPOEA INTERNATIONALIS. Geneva, Editio Prima, Volumen I, 1951.

[2] Buell, Bradley and Community Research Associates, Inc. COMMUNITY PLANNING FOR HUMAN SERVICES. Columbia University Press. 464 pages. $5.50.

this term. The ever-present pioneering influence of voluntary efforts in preparing the way for and in continuing to interpret the need for tax-supported services is peculiar to America. The growth of both voluntary and tax-supported services has been historically gradual until the last three decades of the twentieth century. The prosperity of the 1920s and the depression of the 1930s gave an impetus to an enormous growth in all forms of social services, but particularly to those dealing with dependency, and this has carried over and been continued in the war and the post-war period of the 1940s.

This extraordinarily rapid growth upon a historical base that previously had developed without any consistent, coherent, well-considered pattern in communities, or even at state and national levels, has left the United States in the early 1950s with a group of services so extensive, so manifold in control and operation and so complex, that it is very difficult if not well-nigh impossible to attain a clear comprehension of the whole scene. Further intelligent evolution of these ever-present, widely extended services is obviously impossible without serious effort not only to understand the main trends of this complex picture, but to endeavor to bring about a more systematic, integrated, and meaningful pattern of future developments in local communities and also on state and national levels. To portray the picture of these services as they now exist with enough of their historic setting to make them understandable, to point up the loss to communities through the absence of community-wide planning for coherence and integration with the inevitable waste accompanying this, and to make constructive suggestions for improvement are the objectives which Bradley Buell and the Community Research Associates have attempted in the important publication COMMUNITY PLANNING FOR HUMAN SERVICES.

The value of this publication rests in no small part on the fact that it was preceded by a thorough statistical study of the facts and pattern of community social services in the City of St. Paul, Minnesota, the expense of which was underwritten by the Grant Foundation. This was supplemented by less intensive studies made previously in several other urban communities. The St. Paul study emphasizes first of all that the difficul-

ties compelling the assistance of a community's social services *arise in families*. In other words, if the need for social services arises in the social, basic, and biological unit—the family—it is to the growth, development, and stabilization of family life that social work must turn, if it hopes to lessen the demand for social services.

In the one month—November, 1948—covered by the St. Paul study, 41,000 or 40 per cent of all the families in the community were being served by the city's public and private agencies. A previous study in Syracuse, New York, had indicated that 70 per cent of all the families in that city had been served during the twelve months of 1941 by 100 community social service agencies. Of the 41,000 families helped by the St. Paul agencies, 7,000 or 7 per cent of all the city's families were dependent, 11,000 had problems of maladjustment, over 15,000 had problems of ill health, and almost 19,000 were being served by public and private recreation agencies. In other words, many families requiring the help of one type of service required the help of other types also. For example, 70 per cent of dependent families had problems of ill health or maladjustment. The most significant fact of all perhaps was the fact that a group of 6,600 or about 6 per cent of all families, or 16 per cent of those served by community-supported services, were absorbing well over one-half of the total community's dependency, health, and adjustment services. It is the problem of this residual core of multi-disadvantaged families, that is probably fairly typical of urban communities, to which communities must address themselves in order to hope to lessen the need for their social services.

The size of these widely-spread community social services in the United States is illustrated by the fact that it is estimated that about 13 billion dollars is expended annually to maintain them. In St. Paul alone the annual cost is about 17 million dollars. Somewhat more than one-half of this total is secured from fees and voluntary contributions, 1½ million dollars from federal sources, and the balance from tax funds raised locally. In twenty-nine cities with a total population of 19,312,000, 12 per cent of $814,033,349 expended for social services came from federal funds. In dependency, federal funds amounts to 35.5

per cent. Fees from persons able to pay in whole or in part for their services accounted for 29.3 per cent. If the amount collected from fees paid for services is deducted, the federal proportion of the total expenditure is 17 per cent.

Within the framework of four major classifications of community services which have grown up to meet human needs, the historical evolution and the present basic status of each of these four classifications is developed. The degree of acceptance of community responsibility, an analysis of the major characteristics of the problems involved, the community structure for administering the services, and the extent to which coherence and integration are present (or all too frequently absent) are described for each of the four classifications.

As a result of the facts, analyses, and interpretation brought together in this study, the authors correctly conclude that "the services as now organized and rendered to the people of our communities do not offer a purposeful, comprehensive, well-integrated program." There is, however, a discerned trend toward "coherent community-wide planning," and the acceleration of this trend is dependent upon "(1) a greater unity of purpose; (2) better scientific and professional disciplines, and (3), more coherent national leadership in terms of community-wide guidance and stimulation."

While an enormous literature has previously grown up around various sectors of these rapid developments, no comparable scholarly attempt to present a factual, unified, and constructively critical picture of the whole has previously been undertaken. This volume, therefore, derives its significance and importance chiefly from the fact that it has presented such a picture. For the first time the social service field now has a well-considered, factual presentation, analysis, and interpretation of the basic elements in the complicated social services of communities in the United States, from which it can intelligently plan for more consistent, better integrated, and organized community patterns in order to secure more economic and more useful future social services. In the words of the authors, "the vast networks of health, welfare and recreation services can and should be more effectively planned and organized to prevent and reduce these community-wide problems." The

volume marks a milestone in demonstrating the importance of planning for improving community-supported social services and in the utilization of research as a necessary tool in such planning. It suggests that the time is ripe for "significant experimentation with the systematic community-wide detection and reporting of disorders, diagnostic and prognostic classification, periodic review of progress or retrogression, analysis of the appropriateness of care and treatment, and basic evaluation of results" as timely means of making further progress in the management of community-supported social services and in the prevention and reduction of the necessity for such services.

BAILEY B. BURRITT

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THE PREVENTION OF WHOOPING-COUGH BY VACCINATION[1]

WHOOPING cough is an acute communicable disease that has its greatest incidence and severity among children less than 7 years of age. It is especially severe in infants of less than 2 years. The rapid decline in the incidence and severity of pertussis among older children without a history of a recognized attack makes the postponement of pertussis a most desired procedure. During the past thirty years mortality from pertussis has been reduced mainly by vaccination. Further reduction of pertussis by improved immunizing processes presents a challenging problem to the medical profession.

Since 1942 the Whooping-Cough Immunization Committee of the Medical Research Council has been carrying on investigations "to assess the prophylactic value of pertussis vaccines." In controlled studies carried on between 1942 and 1944 no significant differences were found between groups inoculated with pertussis vaccines and uninoculated control groups. Other similar studies, especially those carried on in the United States and Canada, reported that the pertussis vaccines used produced

[1] The Prevention of Whooping-Cough by Vaccination. A Medical Research Council Investigation. *British Medical Journal,* June 30, 1951, Vol. 1, p. 1464.

a significant degree of protection. Because of the disparity in results, the Whooping-Cough Immunization Committee concluded that "the vaccines used in their trials in 1942 and 1944 differed in some material though unknown way from those vaccines which have been shown to give protection."

A new study was undertaken by the Committee using pertussis vaccines prepared by two American manufacturers, the Messrs. Park, Davis and Company and the Michigan Department of Health, and one British manufacturer, the Messrs. Glaxo Laboratories, Ltd. The first trial, begun during World War II, provided valuable administrative data but, due to a personnel shortage, the follow-up studies were considered incomplete. This pilot study served as a basis for studies which began in November, 1946 and April, 1948 and ended in 1950. These subsequent studies are reported upon in this paper.

Ten field-trial areas were established and a uniform plan was followed in each. A "pertussis team" was appointed which was staffed mainly from the local health departments. Parents with children 6–18 months of age were given a pamphlet explaining the plan and objectives of the study. Interested parents signed a consent form and the resulting group of children were divided by the method of random sampling into two groups of approximately equal size: 1) a group to be vaccinated with the different pertussis vaccines; and 2) a group to be given a similar dose of "anticatarrhal vaccine" which contained no H. pertussis. Three inoculations were given at monthly intervals. Mothers were instructed to notify the local health department if their child had a known exposure to pertussis or if any suspicious symptom developed. After the inoculations each child was visited at frequent intervals for a period from two to three years by a nurse investigator. Neither the parents nor the observers knew whether the child was in the vaccinated or unvaccinated group.

The number of children who completed the three inoculations and remained to the end of the investigation was 6,710; 3,358 in the vaccinated group and 3,352 in the control group. The two groups of children were similar when certain relevant attributes were examined.

In all ten trials the attack rates per 1,000 child-months of

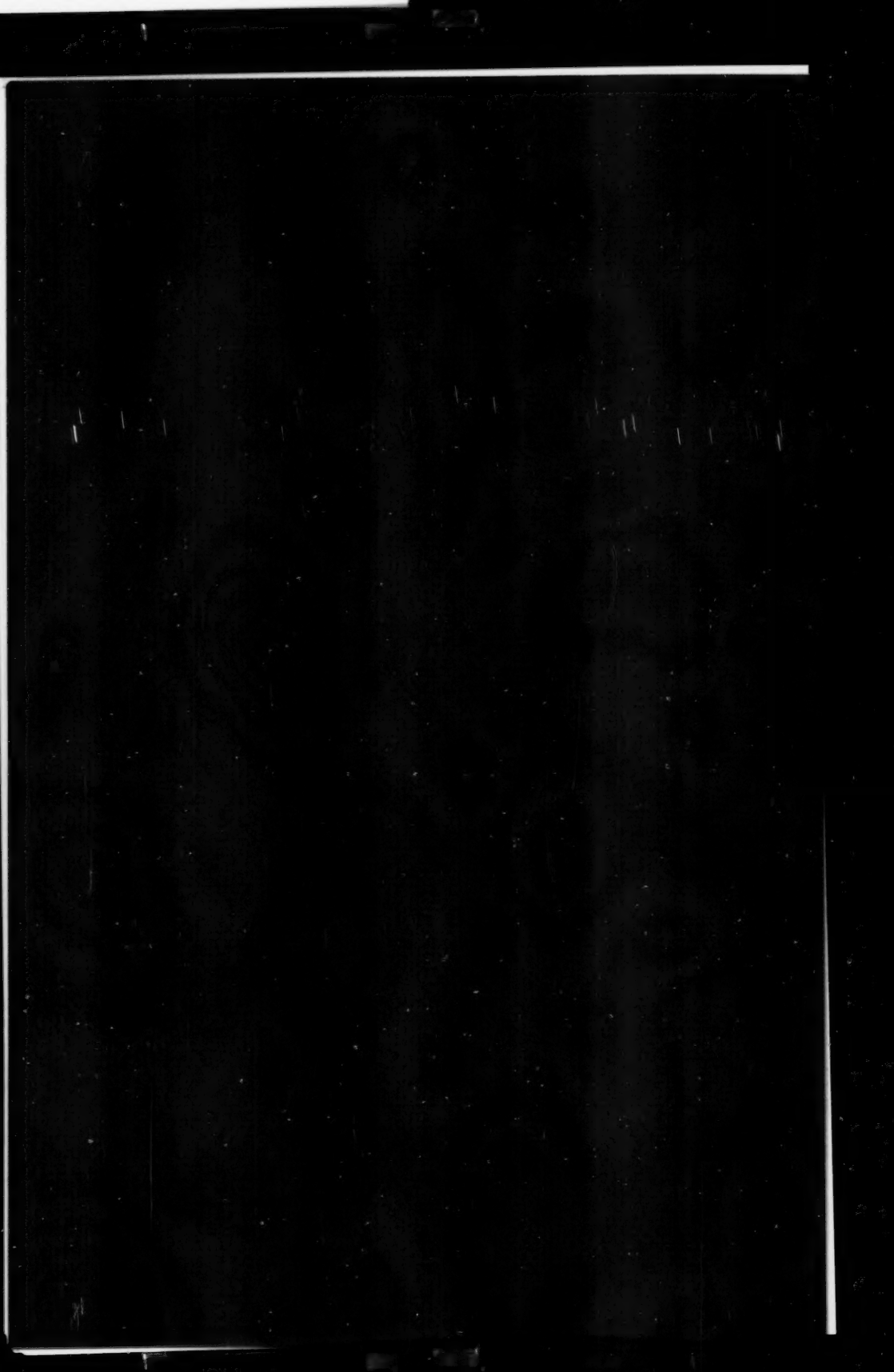
observation were 1.45 in the vaccinated group and 6.73 in the unvaccinated group—a ratio of 1 to 4.6. According to the authors of the report, "This difference in attack rates is clearly significant." The ratio of attack rates was not the same for the ten trials, however.

The attack rates for the unvaccinated children were almost constant, varying only from 6.48 to 7.04 per 1,000 child-months of observation. Among the vaccinated children the vaccines were found to have prophylactic value of varying potencies. The Park, Davis vaccines gave substantial protection with a ratio to the unvaccinated group of 1 to 2.5. A slightly greater degree of protection was given by the Glaxo vaccines. The vaccines prepared by the Michigan Department of Health "gave a considerably greater deegree of protection than any of the others; the ratios with these were 1 to 7.3 and 1 to 10.8."

The attack rates are shown for children who had a known exposure to pertussis. The unvaccinated children had comparable attack rates for known exposures in all trial areas. The attack rates among the vaccinated children varied considerably with the different trials. This variation was related to the differing potency of the vaccines used. Differences in the severity and duration of pertussis attacks between the vaccinated and unvaccinated groups were noted also. In each trial area the vaccinated groups tended to have attacks with less severity (fewer paroxysms per 24 hours), and shorter durations than the unvaccinated groups.

An analysis was made which indicated that the immunity to pertussis among the vaccinated group remained fairly constant throughout the trial period. The attack rate in the unvaccinated children was almost constant during the whole period of observation and "it is therefore justifiable to compare the corresponding attack rate in the vaccinated children."

The different vaccines used have been shown to have varying prophylactic value. These differences may be due to other variables such as the method of preparation by the different manufacturers, the differences in trial areas, and the different times of the trials. Further studies are being carried on both in Great Britain and the United States in the field and in the laboratory to test the potency of different vaccines.

In the United States, pertussis deaths per 1,000 live births among infants have dropped from 2.2 in 1916 to 0.9 in 1940. The Whooping-Cough Immunization Committee has made an important contribution toward further reductions in pertussis mortality by its research in the potency of the different vaccines. When immunizing against pertussis, it is certainly desirable to use the vaccine having the greatest prophylactic value.

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